VOL. 4. NO. 7. JULY, 1906.

THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD. THE BRASS FOUNDER AND FINISHER
AND ELECTRO-PLATERS REVIEW.

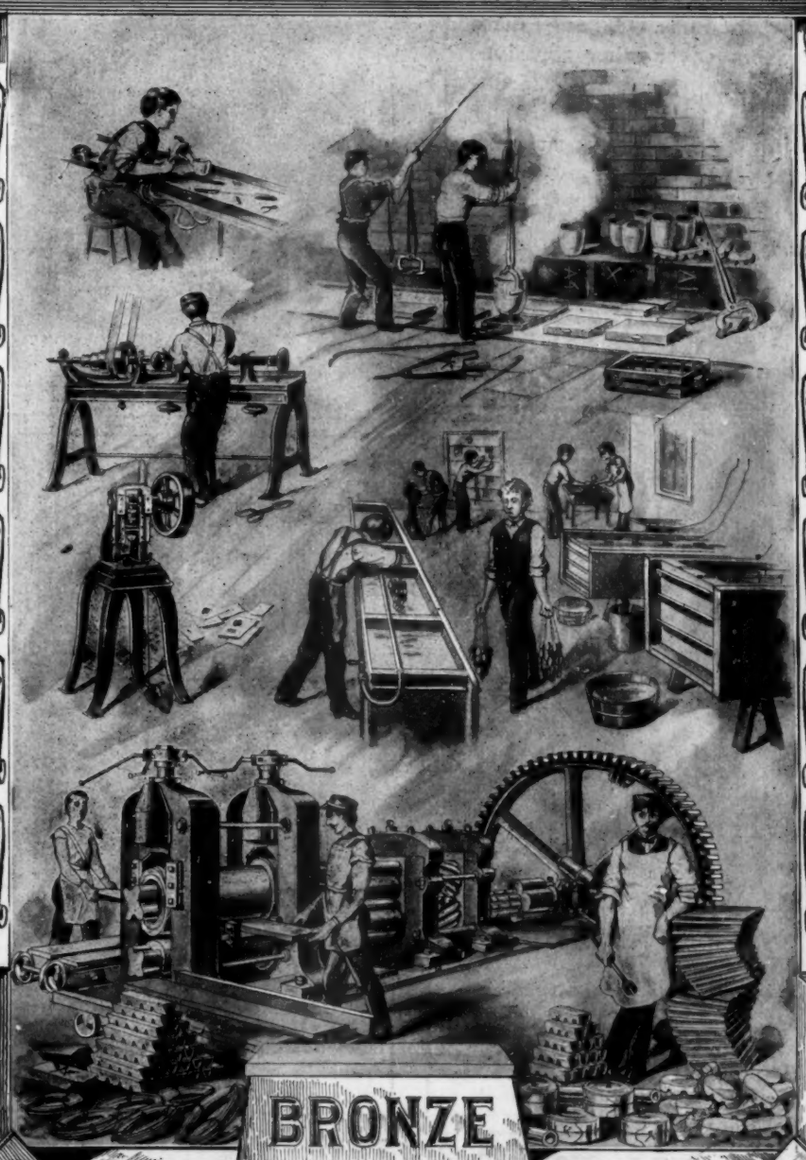
A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

ALUMINUM · COPPER · NICKEL · TIN · SILVER · LEAD · GOLD · ZINC · BRONZE

METALLOGRAPHY · BRASS · METALLURGY

POLLING · DRAWING · STAMPING · SPINNING · PLATING · POLISHING

SMELTING · REFINING · ALLOYING · CASTING · FOUNDING · FINISHING



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ELECTRO PLATERS REVIEW

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A NEW BRASS ASSOCIATION.

The American Foundrymen's Association at their convention in Cleveland, Ohio, last month took the first steps toward the organization of a new society of founders to be called The American Brass Founders' Association. The formation of such a society was considered a year ago at the convention held in New York City but no official action was taken. This year the project was informally introduced to the members who generally believed that the brass interests were of sufficient importance to have such a society and the outcome of the suggestion was the appointment of Mr. Charles J. Caley as President and Dr. Richard Moldenke as Secretary to work out the plans for such a society and to report at the next convention of the American Foundrymen's Association to be held in Philadelphia June, 1907. Mr. Caley is general superintendent of the Russell & Erwin Manufacturing Company, New Britain, Conn., one of the largest manufacturers of brass goods in the United States, and at the Cleveland convention he was elected vice-president of the association from New England. Every foundryman knows who Dr. Moldenke is. If he does not he should, for in brief he is the leading spirit in the Foundrymen's Association.

In general it may be said that the purpose of the American Brass Founders' Association will be the same as the American Foundrymen's Association—to improve foundry conditions and educate foundrymen up to a higher standard of workmanship—and it was thought better to organize a separate society rather than a section of the parent organization. It is proposed, however, that the Brass Association meet at the same time as the Foundrymen's Association, by which means they will have all of the advantages which are to be obtained by a united convention. Therefore, in Philadelphia next June it is expected that the American Brass Founders' Association will become an established fact and will in time become as popular with the brass interests as the Foundrymen's Association is to-day with the iron interests. That the association is popular is proven by the remarkable attendance at the last convention which reached the

registered figures of 820, some 500 more than the usual number of registered names. There were at least 650 active foundrymen present. One of the particularly attractive features of the convention was the exhibits, which were shown for the first time in actual operation. Steps have already been taken to have a larger number of exhibits at Philadelphia, 1907, and with the prospect of a brass society meeting at the same time, no doubt there will be an inducement for a special exhibit of brass foundry equipment.

THE SALE OF SHEET COPPER.

Custom is a master which, whether good or bad, is difficult to shake off and one of the peculiar customs which is still in use in the copper trade is the selling of sheet copper in three different ways. The ways are so peculiar that it requires considerable explanation to master the detail and are so complex that a number of the mills have found it necessary to issue printed matter to instruct their customers how to order copper. For example, we will take a sheet of copper 30 x 60 inches, and see how different buyers would order copper of the same thickness.

First, there is the coppersmith who orders his metal by the pound sheet, which means so many pounds to 12½ square feet or as it is figured out by the mill a single sheet 30 x 60 inches is the standard by which the coppersmith orders. Only an experienced copper man can tell how many pounds this would be. The coppersmith usually specifies his order 30 x 60 x 12½ lbs. thick.

Second, there are the roofers who order their copper by the ounce, that is the number of ounces to the square foot. If he orders a sheet of metal this order would read: one sheet of copper 30 x 60—16 oz. It can readily be seen that ordering both by the pound and by the ounce is confusing enough to the ordinary mind.

Finally, there is the manufacturer of metal goods who has his copper like his brass supplied to him by the Gauge, which is a decimal system and is the simplest method of ordering copper. His order would read: one sheet copper 30 x 60 No. 24 Stubs' Gauge. A disadvantage in the gauge method is the excess weight.

If the sheet is gauged on the edge it will be thicker in the center which would mean an overweight and for which there has to be an allowance. This excess weight is recognized by the United States Government which prepares tables giving an excess weight allowance.

Therefore there are three different ways of selling copper, each one of which has become a custom (not exactly explained why) for the trade which uses it and which requires the mill man to do more or less constant thinking to fill his orders correctly. It would seem as if there might be a system devised by which sheet copper could be sold in one way, as, for instance, by the gauge system which is the simplest and most accurate method. We presume, however, that it would be a number of years before the copper rolling mills could agree on one method of selling sheet, no matter how desirable. These changes to standardization are apt to come very slowly no matter how advantageous. Three years ago THE METAL INDUSTRY mentioned the importance of standardizing the size of crucibles, and about every crucible manufacturer agreed that it would be a very good thing to have a standard size of crucible but for many reasons they did not care to make the change. We take it that, unless there should be an earthquake or radical change in trade conditions which would bring the necessity of standardization right home to the manufacturer, custom will prevail and the rolling mills will sell the metal in the same complicated way for many years in the future.

A TUBE ORDER FROM BRITAIN.

An American rolling mill was recently surprised by an order from an export house for 22,700 pounds of seamless brass tubing, which tubing was for British consumption. The American mill being extremely busy could not handle the order, but appreciated the fact of business coming from abroad, particularly for tubing which is generally supposed to cost less to manufacture in Great Britain than in the United States. The fact that the order came to America at all is explained by the difference in the custom of the rolling mills of the two countries. The American practice is to trim the tubing to certain sizes, smoothing off all of the rough edges and making no extra charge for this service, while in a British mill it is customary to charge for this extra work. The specifications also called for a good smooth tubing. That the American rolling mill products are holding their own in some of the British colonial markets is shown by the good business that the American mills are doing with Canada in spite of the preferential tariff which favors British goods.

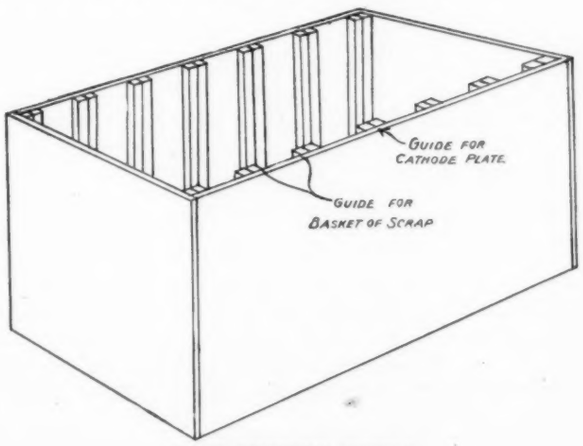
SCIENTIFIC METALLURGY.

We present this month the conclusion of the article on "The Practical Application of Scientific Metallurgy to the Foundry and Rolling Mill," which was begun in the June number. Mr. Lewis brings to the consideration of his subject a wide experience and an intimate knowledge of scientific metallurgy as applied to the practical work of the brass industry. He makes a strong plea for a technical acquaintance with each of the ingredients of a copper alloy, and shows the advantages of possessing such information. He intimates, and we think truly, that rule of thumb methods are gradually passing to the rear and that the plant desirous of occupying a position in the front rank must adopt the refinements found to be so essential in other industries. Metallurgy and mechanics are close rivals for precedence in the steel trade, and a like condition now prevails in the most advanced of our brass mills.

AN ELECTROLYTIC PROCESS OF DETINNING OLD CANS AND OTHER TIN PLATE SCRAP.

By Howard G. Bayles, Met. Eng.

A number of chemical and electrolytic processes for recovering tin from scrap have been patented and exploited. Most of them have proved too expensive and have been abandoned. Many plants in which the process was sufficiently economical have been forced to cease operation on account of the cost of procuring scrap metal to treat. Of those that have proved successful, such as the Goldschmidt process in use at Essen, Germany, there is little to be learned. Patents are an insecure protection at best, and expire in any case, so that this, like a large number of trade processes, is simply kept secret, and information is difficult to obtain. It is known, however, that the processes, patented and otherwise, that depended on an acid solvent proved too costly. The iron was also attacked, and the acid needed constant renewal. Ferric chloride solution, combining with the tin to form stannic chloride, has been used in the Garcia process. No electric current is needed in this operation, the action being simply chemical. The prohibitive cost of the process was due to the sulphuric and carbolic acids used in preparing the electrolytic bath for the subsequent recovery of the tin from solution, and to the constant supply of fresh solvent necessary.



TANK SHOWING GUIDES.

Although, as I have already said, the secrets of successful practice are carefully guarded, there is no doubt that the plants working profitably in Germany, Austria and this country use a solution of caustic soda, or one of sodium nitrate, as the electrolytic bath, and the scrap as the anode. The practical application of this method would be somewhat as follows:

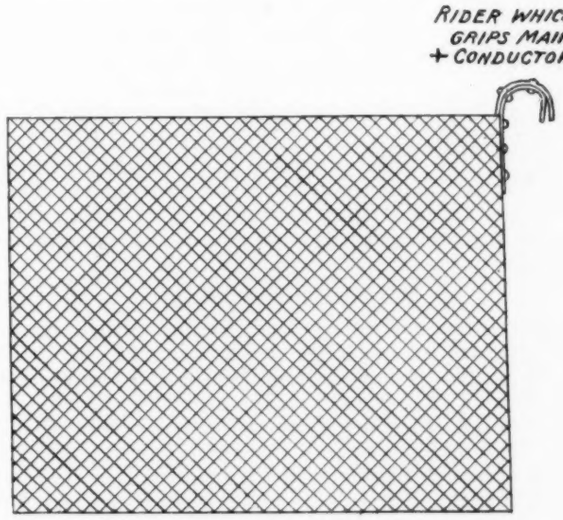
A tank is made of heavy wood, and provided with vertical guides on opposite sides to hold in place the baskets of scrap and the receiving or cathode plates. A tank 4 feet 8 inches long, 30½ inches wide and 28 inches deep inside will be of convenient size, and will hold six baskets of scrap metal. Each basket is 6 inches long, 30 inches wide and 24 inches deep, outside measurements. They are made of heavy iron wire, with ¾ inch or 1 inch mesh, or of perforated sheet iron. Three inches are allowed between baskets, making the cathode plate 1½ inches from a basket. For six baskets, seven cathode plates should be used. The end cathodes may be placed only 1 inch from the ends of the tank. The plates are of iron or copper, 30 inches x 24 inches x 1-16 inch. Blocks should be nailed in the bottom of the guides to hold both the baskets and plates 1 inch from the bottom of the tank. This leaves room for sludge to accumulate.

The conductors, of heavy copper wire, are bare and fastened along either edge of the tank. Hooks on the baskets and plates make the electrical contact.

The solution is made of commercial caustic soda, about 30 lbs. per 100 qts. of water. It must be kept at a temperature between 140 and 160 Fahrenheit. This may be done by passing a few turns of exhaust steam pipe around the box.

To start operation, one or more of the baskets is filled with scrap to be detinned, and the full baskets are connected in parallel with the positive electrical conductor. Cathode plates are put in place, enough being used so that each basket has a plate on each side, and they are connected to the negative conductor. The tank should contain sufficient solution to cover the baskets and plates.

The electrical power necessary for this work will be a pressure of about 1.5 volts and a current density



BASKET FOR HOLDING SCRAP METAL.

of 10 amperes per square foot of plating surface. With such a tank as the one above described, working full, the current necessary would be 600 amperes. The time of immersion of the scrap will vary with the amount of tin to be transferred. The above current, $600 \times 1.5 = 900$ watts, will plate about 14 ounces of tin per hour. Knowing the weight of scrap put into the bath, and approximately the percentage of tin to be recovered, the time of treatment can be easily calculated for any special case. At New York rates, the electricity bill will come to between $35 and $40 per ton of tin recovered.

The tin is deposited on the cathode plates in a spongy mass that can be easily scraped off by hand. If this tin sponge is heated where air can reach it, it will oxidize away. Probably the best method, therefore, is to cover it with a little powdered charcoal or coke breeze and melt it in a closely covered crucible. Its exposed surface, and consequently its oxidation, can be diminished by pressing the sponge into cakes before melting.

If old cans are to be detinned, they should be washed to remove paper, paste and grease, which would saponify the caustic soda, and cut up to diminish the space occupied and also to allow the solution free access to all parts. Instead of cutting up, cans may

be pressed or hammered flat, and a few holes punched through them.

If the sodium nitrate solution is used instead of the caustic soda, care must be taken to get it rather pure. Crude Chili salt contains chloride and sulphate impurities that will interfere seriously with the proper working of the bath. The bath will tend to become alkaline by the conversion of part of the nitrate into caustic soda. This must be corrected by the daily addition of a small amount of dilute nitric acid. A slight acidity is preferable to an alkaline state. Its condition can be easily tested with litmus paper, which will turn blue in an alkaline solution and red if free acids are present. Pure sodium nitrate will not produce either reaction.

I recommend the caustic soda solution, as likely to give less trouble with the corrosion of copper wires, etc., around the shop, and also as requiring less frequent attention. The exact strength of solution that best meets particular requirements can only be learned by individual experience.

One source of profit that must not be overlooked is the value of the sludge, which will contain lead and antimony from the solder. This should be saved, washed, dried and sold on its analysis whenever enough accumulates to make it worth while.

There is no doubt that practical operation will suggest a number of minor improvements that can be made in the above process. It will, however, work as I have outlined it, and at small cost. The question of how profitably it can be conducted is largely dependent on the cost and regularity of a supply of scrap.

COMPOSITION OF SOLDER.

Warranted half-and-half solder contains 50 per cent lead and 50 per cent tin, and nothing but new metal is used. The commercial half-and-half contains, approximately 60 per cent lead and 40 per cent tin. This is made from scrap or old metal, and the alloy will vary a trifle in composition as the scrap varies. No. 1 refined contains 55 per cent lead and 45 per cent tin, made from new metal. Extra wiping contains 60 per cent lead, 38 per cent tin and about 2 per cent antimony. Wire and strip are usually made according to specifications. The solders made from new metal will show a trace of copper and antimony.

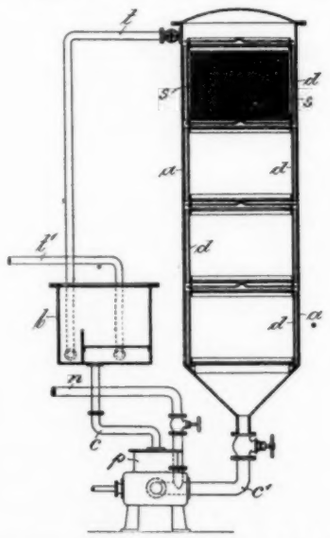
ANTIMONIAL SHEET LEAD.

The Hoyt Metal Company, of St. Louis, Mo., and New York City, announce that one of their new products is antimonial sheet lead, for the production of which they have built a special rolling mill. Among the advantages claimed by the company for antimonial sheet lead are its rigidity and the fact that it does not buckle nor creep. It is superior in its ability to resist acids. It possesses more than double the strength of chemical lead, and when expanded by heat will contract to nearly its original condition. It is lighter than chemical lead, the 10 per cent grade weighing 8 per cent. less. The seams can be either soldered or burned. It is rolled to the same size and thickness as chemical lead.

Consul G. N. Ifft, of Chatham, reports that the new English process of making white lead by precipitation is being adopted in Canada. A 5-ton plant will be in operation near Toronto in a few weeks by a company for whom machinery and appliances for a 50-ton plant are being made. The ores from which white lead is made are found in large quantities in Ontario and Quebec provinces.

NEW METHOD OF DETINNING SCRAP.

Letters patent have been issued (May 29, 1906) to Karl Goldschmidt and Joseph Weber, of Essen-on-the-Ruhr, Germany, for a new method of detinning scrap. The tin scrap is first compressed into bundles of such a size that they can afterward be used directly in the furnace. Preferably these bundles weigh from 50 to 60 kilograms. They are arranged in baskets for convenient placing in a receptacle that can be closed tight. Connected with the top and also with the bottom of the vessel is a pipe, the lower one of which leads to a pump. The pump is fed from a tank into which the upper pipe discharges. The chief point of the invention is to submit the tin scraps in a firmly compressed state to the



VERTICAL SECTION OF THE APPARATUS.

action of the mixture of an anhydrous fluid containing, or having dissolved, chlorine gas. It has been proved by experiments that the reaction of the chlorine takes place even in the narrowest and most firmly closed spaces between the scrap, so that detinning is perfect throughout the mass.

After the vessel has been filled with the bundles of scrap a certain quantity of fluid chlorid of tin, in which chlorine gas has been dissolved, is introduced at the top. The chlorid of tin and the chlorine gas are fed through separate pipes. The former comes in contact with the surfaces of the tin scraps, and the chlorine dissolved in the fluid chlorid of tin acts upon the tin of the scrap and chlorid of tin is formed. The fluid chlorid of tin flows down, and new fluid chlorid of tin in which chlorine gas is dissolved, is led into the vessel. In actual operation the vessel may first be filled with fluid chlorid of tin or a certain quantity of chlorine gas may be introduced first; but the chief point is to always take advantage of the reaction of an anhydrous fluid in combination with chlorine.

THE HARDWARE BABBITT METALS.

The hardware babbitt metals are found in four grades, viz., Nos. 1, 2, 3 and 4. They are made from a stock metal, usually hard lead (antimonial lead). This stock metal is sold as No. 4 metal. Tin is added to the stock metal to make the other three grades. No. 1 contains about 20 per cent tin, No. 2 about 12 per cent, and No. 3 about 5 per cent. The ordinary composition of No. 4, or hard lead, is, lead, 77 per cent; antimony, 20 per cent; copper, 1 per cent; arsenic, 1 per cent; tin, 1 per cent.

THE PRACTICAL APPLICATION OF SCIENTIFIC METALLURGY TO THE FOUNDRY AND ROLLING MILL.

By Ernest A. Lewis, Birmingham, England.

(Concluded from June Number.)

IMPORTANCE OF THE CASTING TEMPERATURE.

Although for plain work, whether gun metal or brass alloys are being cast, a moderate temperature, not boiling nor yet pasty, gives the best results. As regards tensile strength, it must be remembered that although good experimental results can be obtained by casting plain rods at a moderate temperature, it will lead to failure if you attempt to cast a complicated pattern with thin and thick parts, or a small article with a core in it, the resulting casting of which has very thin walls. Such articles must be cast immediately the metal has ceased boiling or they will be drawn. Experience will show the best temperature to cast different alloys for similar castings. Gun metals and phosphor bronzes require considerably larger gates, runners and feeders than brass alloys.

A brass alloy will give a good casting of the same pattern at a much lower temperature than gun metal, because brass is more fluid than gun metal. The larger the casting the lower can be the casting temperature, but neither brass, gun metal or copper should be poured pasty. It is a most unsatisfactory practice and it is often done in foundries, when a lot of boxes are being cast and when the pot is getting empty, to put in the heads of the runners of the first boxes cast and stir them into the metal to make sufficient metal to cast another box, it will be found that the last box of castings are often drawn.

The order of casting a series of boxes should be arranged, if possible, so that boxes containing complicated patterns should be cast first and have the hottest metal, and plain castings which can be cast at a moderate heat last. This will give good results all round.

GENERAL RULES TO GET GOOD CASTINGS.

All metals used in the foundry must be carefully weighed out.

All metals, except it is pure copper for electrical purposes, should be thoroughly skimmed before casting, to remove sand, charcoal and slag. Very fusible slag on the top of gun metal or phosphor bronze can be removed by a little dry, clean sand being stirred into it, and then puling it off pasty. The surface of the metal should be blown with a bellows to remove any sand and charcoal, which has not been skimmed off. A skimmer should be held at the mouth of the pot to keep back dross or oxide, which is continually forming on the surface of molten metal. When casting pure copper the layer of charcoal should be held back with a stick to prevent oxidation of the copper.

The foundry should be kept tidy, especially around the casting furnaces.

If there is a metal warehouse for storing metals, as there ought to be in every well arranged foundry, every parcel of metal of which the composition is known should be labeled, and bins should be kept for putting in the borings and turnings of different alloys. In well managed engineering works the turnings of different alloys are as far as possible kept separate in the turning shops, so that they can be used up again in the same alloy in the foundry, without altering the composition of the mixture.

Separate skimmers and stirrers should be used for each type of alloy.

Crucibles which have been used for phosphor bronze must not be used for gun metal.

If it is found that an alloy is giving unsatisfactory results, do not try altering the mixture. If it has given good results before it will give them again. There is something else at fault, not the mixture. Probably the copper is wrong, or inferior scrap is being used. Take an example of ordinary gun metal containing: Copper, 88%; tin, 8%; zinc, 2%; lead, 2%, after giving good results for months, several heats gave hard metal and difficult to turn. The cause of the trouble was the use of scrap copper rods, which contained 0.1% phosphorus, which were used instead of ingot copper.

ALLOYS FOR THE ROLLING MILL.

STRIP, BOLT AND TUBE CASTINGS.

These should be cast at as low a temperature as possible, without being pasty; but scrupulous care is necessary to remove dirt from the surface or it will show itself later on when the casting is rolled or drawn. There is no need to boil brass in the furnace before casting as is often done; in fact, it is injurious to the metal. The metal should be heated sufficiently to be thoroughly fluid, then removed from the furnace and allowed to cool down to the proper temperature. The ingots should be dressed with a mixture of vaseline oil and powdered charcoal, or lard oil mixed with charcoal.

THE COLD ROLLING ALLOYS.

The best brass rolling alloys are the Tombac alloys, containing from 75% to 85% copper. Only the purest metals can be used in making them. They are mostly used for cartridge cases and high-class ornamental brass work.

The next type are the alloys containing from 70% to 75% copper. They are used in locomotive tubes, also in condenser tubes as well as for sheet brass. Tubes of this mixture are usually specified to contain not more than 0.5% total impurity, or 0.25% of any single impurity.

The next type is common brass, generally known as 2 and 1 mixture, that is: Copper 66 2-3%, and zinc, 33 1-3%.

None of the above alloys can be rolled hot as ordinarily made, that is because the lead that is always present in commercial brasses is in the free state, and when you try to roll it hot the lead which is molten in the metal causes cracks. I discovered some time back that under certain circumstances the alloy of copper 70% and zinc 30% can be rolled hot as easily as yellow or muntz metal, but I am not able to publish details of the process.

THE HOT ROLLING ALLOYS.

The next series of brass alloys are the hot rolling alloys.

The best alloys of this type contain 61 to 62% copper, but cheaper alloys are made with 56 to 60% copper. The best mixture to resist corrosion contains 61.5% copper and about 0.2% tin or iron. When 1% tin is added to yellow metal the alloy known as naval brass is obtained. It contains: Copper, 62%; zinc, 37%; tin, 1%. In the yellow metal alloys the lead is present, combined with a portion of the alloy, and this is the reason that the alloy can be rolled hot.

Screwing metals are types of yellow metal containing 2% of lead. They turn better in the lathe than yellow metal.

ANNEALING TEMPERATURE FOR THE BRASS ALLOYS.

The higher the contents of copper in brass the greater heat will it stand without burning, but although a plate of brass ¼ to ½ inch thick will stand a full red heat without burning the same mixture in the form of sheets 1-32 of an inch in thickness would burn at this temperature. The presence of tin and lead will cause brass to burn at a lower temperature than the same alloy made of the pure metals. From this it will be seen that the purer the alloy the more heat it will stand without burning. In regard to the hot rolling alloys, the alloy of copper 62% and spelter 38% can be rolled at a red heat without injury, but the alloy of copper 58% and spelter 42% can only be rolled at a dull red heat or it will be brittle.

The proper annealing temperatures are approximately as follows:

Thick brass sheets containing 70 to 80% copper..750° C.
Thin brass sheets containing 70 to 80% copper..700° C.
Thick brass sheets containing 60 to 70% copper..700° C.
Thin brass sheets containing 60 to 70% copper..650° C.

THE USE OF THE MICROSCOPE.

During recent years considerable advances have been made to our knowledge of brass alloys by the application of the microscope to examine the crystalline structure, but this method of examination has not yet reached the same practical importance in the brass trade that it has in the iron and steel industries. There have been numerous papers published describing the methods of preparing metals for microscopic examination, and if a microscope is available very interesting results can be obtained by taking micro-photographs of various brasses after different heat treatment. That is to say, examine the cast metal, then, after breaking down, annealing at different heats for different lengths of time, finally burn the brass and examine its structure.

ANNEALING AND ROLLING OF COPPER.

When speaking of burning copper it must be remembered that there are various kinds of copper. Some varieties are much more easily burned than others. There is copper made in the refinery containing 0.1% to 0.2% oxygen; there is arsenical copper containing 0.4% to 0.6% arsenic also made in the refinery; and there is deoxidised copper cast from pots containing 0.05% to 0.1% phosphorus, and this latter copper is always made from very pure ingot copper. Now, refined copper containing 0.2% oxygen can be made nearly white hot, 950° C, without burning. Arsenical copper will not stand more than a good red heat, 800° C; but the last variety of copper, the deoxidised copper, should never be heated to more than 700° C, and for annealing tubes of this latter kind of copper a dull red heat for ½-hour is sufficient. It is bad practice when the ends of a tube only are required to be annealed to put them into the fire hole of an annealing furnace. A special furnace should be built for this purpose.

CRUCIBLES.

A good plumbago crucible should stand on an average 25 heats. I have known them stand more than 40 heats. To economize in crucibles it is best to use a good make of pot even if they are a little more expensive.

COKE.

A fairly hard coke is the best for brass foundries. It should not contain more than 2% sulphur or 10% ash. A thoroughly representative sample of the coke should be tested occasionally in the laboratory.

COAL.

This should be of good quality. It should not contain more than 2% sulphur, 7% ash, or 5% moisture. The calorific power should be about 7,000. Some coals contain from 20% to 25% ash. This is an absolute loss to the manufacturer.

ENGINE OILS AND OTHER STORES.

Large works which have their own chemist will find it to their advantage to test their stores. A competent chemist should be able to advise on these matters as well as on the purity of metals.

ERNEST A. LEWIS.

April 21st, 1906.

THE USE OF PRODUCER GAS IN BRASS MELTING AND BRAZING.

In a paper read before the Birmingham (England) Association of Engineers Mr. A. E. A. Edwards gives some data about brass making by producer gas. A number of tests have been made showing the results obtained and these are given in the following table:

Metal.	Weight.	Time melting.	Gas used.	Gas per cwt.	Fuel per cwt. of metal melted.	Remarks.
Copper...	14 lbs.	45 min.	210 cu. ft.	1,680 ft.	21 lbs.	Cold Furn.
Copper...	14 "	33 "	165 " "	1,320 "	17 "	
Brass.....	34 "	60 "	272 " "	890 "	11 "	Cold Furn.
Brass.....	50 "	104 "	980 " "	2,200 "	28 "	
Brass.....	50 "	90 "	850 " "	1,920 "	24 "	

Tests have also been made with the use of producer gas in brazing. It has been found that brazing in this manner necessitates special blowpipes. It is only a waste of time to attempt it with a coal gas blowpipe. An oxygen blowpipe of large size will do, but it is better to have the pipes specially constructed. Some tests on assorted articles brazed by producer gas and town gas at a chandelier manufactory are stated to have shown that even with a man inexperienced in the use of the gas the time occupied with the producer gas was only three minutes longer than that for town gas in 42 tests.

Three points are essential for brazing with producer gas, namely, first, an ample supply of gas of good quality; second, the use of an air pressure of at least two pounds to the inch, and third, the use of a specially constructed blowpipe giving an ample gas way and an air nozzle with a hole of about ⅛-inch diameter.

CASTING ALUMINUM IN IRON MOLDS.

It is very difficult to cast aluminum successfully in iron molds, owing partly no doubt to the high shrinkage of the metal and also to certain inherent qualities which distinguish it altogether from those metals which do give good results in metal moulds. It is doubtful if aluminum can be cast even in the simplest forms in a metal mold so as to secure a thoroughly smooth surface and one which would not require polishing. The only precaution is to be careful not to have the molds too hot nor to have the metal too hot. Best results occur when the heat of the mold is only moderate. If the mold gets too hot there seems to be a tendency for the metal to oxidize and form what might be called "feathers" on the exterior, which very much heighten the roughness of the casting.

Australian metallurgists claim to have solved the problem of treating refuse zinc ores, of which many millions of tons have accumulated. These ores having been treated for the lead and silver residues, carry 6 per cent lead, 20 per cent zinc and 6.3 oz. of silver per ton. A company has been formed in Melbourne, with a capital of $1,750,000, for the purpose of reclaiming metals from these tailings.

The greatest gold producing country in the world is South Africa, where the mines during the last year produced close to $100,000,000 worth of precious metal. The next largest producer is the United States.

THE AMERICAN FOUNDRYMEN'S ASSOCIATION.

ELEVENTH ANNUAL CONVENTION.

The eleventh annual convention of the American Foundrymen's Association opened in Cleveland June 5 with a registration on the first day of over 700, which reached 820 at the close, the largest in the history of the organization. The sessions were held in the Central Armory, the main drill room of which contained the wide line of exhibits of the foundry supply houses and manufacturers of equipment. Many of the exhibits were in full operation, and as a whole formed an example of modern foundry practice. N. S. Calhoun, of the Johnson & Jennings Company, welcomed the visitors on behalf of the foundrymen of Cleveland, the response being made by the president, Thomas D. West.

THE NEED OF A PRACTICAL EDUCATION

was the title of the annual address by the president. Mr. West dwelt particularly upon two factors in our educational system which he considered of great importance, namely, a practical education and manual skill. He said that there are many, old and young, who are unable to earn a living because of their lack of one or both of these advantages. There is a demand for manual skill, and he thought it should be encouraged more than it is. Mr. West would confine our education to those subjects that can be directly utilized and would cut out all ornamental studies, the acquisition of which consumes from one to four years. The child should have a good common school education and then the parent or guardian should discover the most marked tendency of the child and direct his education in that direction. The studies should be confined closely to the line selected and all outside matter discarded. Every effort has been directed toward perfecting the course for the professional or classical student and but little attention has been paid to the requirements of practical training.

Specialization is now obligatory for the simple reason that the time has gone by when a man can become a master molder, machinist and blacksmith. Those who are highly skilled in the art of founding know that he who wishes to be in the lead, or the master of the sand heap and cupola, either as a worker or manager of men, can spend every minute of a ten-hour day in the shop and his evenings in study and research during a long life and still have much to learn.

A reform in this direction would be made chiefly by our leading associations. A founders' committee would not, I think, recommend the wasting of time by those wishing to learn the art of molding upon studies that could rarely if ever be utilized. The preparatory study could be narrowed to a common school education, with drawing, chemistry and some metallurgy. The latter three could be taken after leaving the regular school as special studies in day or night schools under an instructor knowing just how much of these studies the molder, foundry foreman or manager should pursue. This committee could also select the books to be read at leisure, in addition to those needed as text books.

THE SECRETARY-TREASURER'S REPORT.

The report of Dr. Moldenke, the secretary-treasurer, showed the association to be in a flourishing condition in every respect. In regard to trade schools the report said:

"Considerable progress has been made along the line of trade schools during the year. Our association is not in position to finance any such undertaking. It can but recommend and urge the need of these public improvements. Others are taking up the question and are better able to carry it through. We rejoice with them that education is thus making headway, and we need not fear European competition quite so seriously as formerly. Let the good work go on, however. It satisfies our pride to have done the preliminary labor."

UNIFORM PRACTICE IN FOUNDRY COST FINDING.

Kenneth Falconer, of Montreal, in a paper on Uniform Practice in Foundry Cost Finding, made a strong plea for better and more uniform methods. To standardize methods of costing and estimating in any industry a clear understanding of the term "costs" as applied to manufactured product is essential. To some it means only the value of material and labor consumed; to others it includes expenses incurred in running the plant; while the elect take it to cover, in addition, all expenses of selling and administration, and in some cases all possible outlays. The author mentioned the benefits that would accrue from the adoption of a common system of cost finding, and while he did not present any recommendations he argued for "a determination in view of the conditions of each plant and business of what is the right and logical method of distributing expenses on product, of obtaining costs, and of carrying the results into the books."

GOOD MOLDERS—WHY ARE THEY SCARCE?

was the title of a paper by W. S. McQuillin, of South Norwalk, Conn. It is the universal opinion among foundrymen that good molders are scarce and that they are growing scarcer year by year, and we hear much in general that the craft is not up to the high standard which should mark the present times. The author does not attempt to solve the question he propounds. It may be that bright young men do not learn the trade because there is, day by day, less demand for the exercise of his brains. The introduction of the molding machine and specialization have in some degree been responsible for this. The paper concludes as follows:

The time is not far distant when a vast deal of the work now requiring more or less skilled molders will become specialized and handled in greater volume by special methods and machines, requiring little skill to operate. In spite of this, however, there is, even in the dim future, no indication that thoroughly trained and educated mechanics will not be needed. On the contrary, while mother earth continues to give up the bountiful supply of metals used in casting, there will be a demand for "good molders."

A TALK ON ALLOYS

by C. Vickers, of Milwaukee, discussed the copper alloys and their physical characteristics. All alloys of copper high in zinc are much improved in casting qualities by the addition of aluminum, said Mr. Vickers. When heated, some of them become very plastic and can be worked into complex shapes. Externally they have a beautiful yellow color tinged with green, and when soiled, may be restored to their original beauty by heating to faint redness and quenching in water.

Antimony can be used to harden copper, without materially changing its color. An alloy of copper 10 parts, silicon copper ⅛ part, antimony ½ part, is hard, tough, sonorous and useful for many purposes where a hardened copper is required. Silicon is used in copper alloys as a deoxidizer; one pound of silicon copper will deoxidize 100 pounds of casting copper and make perfectly solid castings. It is much better for this purpose than phosphorus, as the castings run clean and bright.

The Exhibits

shown at the convention were conceded to be the most complete of any convention yet held.

J. D. Smith Foundry and Supply Company had a very complete exhibit of foundry supplies.

Buckeye Sand Company, of Pittsburg, an attractive display of 23 samples of molding sand.

Electric Controller Company, of Cleveland, exhibited a large lifting magnet in operation.

Wm. Dobson, of Canastota, had a very neat display of molders' tools.

Wellman-Seaver-Morgan Company, Cleveland, general drawings and plans for iron and steel foundries.

Goldschmidt Thermit Company, New York, thermit in actual use.

E. H. Mumford Company, Philadelphia, the Rathbone multiple molding machines in operation.

Tabor Manufacturing Company, Philadelphia, vibrating molding machines in operation.

Interstate Sand Company, Cleveland, large exhibit of molding sand, 66 distinct varieties.

Diamond Clamp & Flask Company, Richmond, Ind., large display of flasks and appliances.

Detroit Foundry Supply Company, riddles and sieves.

Chisholm & Moore Company, Cleveland, chain hoists and trolleys.

Arcade Manufacturing Company, Freeport, Ill., modern molding machine in operation.

Harbison-Walker Refractories Company, Pittsburgh, fire brick and fire clay.

Chicago Pneumatic Tool Company, pneumatic tools in operation.

W. W. Sly Manufacturing Company, dust arresters and cleaning mills in operation.

Buckeye Milling Company, Cleveland, core compounds.

Cleveland Wire Spring Company, steel shop barrels and boxes.

B. F. Sturtevant Company, Boston, centrifugal fan blowers and high pressure rotary blowers.

Falls Rivet and Machine Company, Cuyahoga Falls, O., the Wadsworth core room equipment in operation.

Atlas Car Manufacturing Company, Cleveland, industrial railway equipment.

Osborn Manufacturing Company, Cleveland, brushes and brooms.

The New Officers.

On the last day of the convention the following officers were elected for the ensuing year:

President, W. H. McFadden, Pittsburgh, Pa.
Vice-presidents, Chas. J. Caley, New Britain, Conn.
John W. Burr, Brooklyn, N. Y.
Stanley G. Flagg, Jr., Philadelphia, Pa.
J. H. Whiting, Chicago, Ill.
W. J. Keep, Detroit, Mich.
Thos. Sheriff, Milwaukee, Wis.
J. B. Golden, Columbus, Ga.
L. L. Anthes, Toronto, Canada.

Secretary-Treasurer, Dr. Richard Moldenke, Watchung, N. J. Dr. Moldenke was warmly thanked for his untiring efforts on behalf of the association. It was decided to hold the convention in 1907 at Philadelphia. Toronto has invited the association to hold their convention there in 1908, and it is probable that they will do so. A committee was appointed to work on the subject of Uniform Practice in Foundry Cost Findings, after which the convention adjourned.

American Foundrymen's Supply Association.

A feature of the convention was the formation of the American Foundrymen's Supply Association, a kindred organization of the parent society and which elected the following officers:

President, S. T. Johnson, Chicago, Ill.
First vice president, E. H. Mumford, Philadelphia, Pa.
Second vice president, E. A. Kelber, Pittsburgh, Pa.
Secretary-treasurer, H. M. Lane, Cleveland, Ohio.

The idea of the association is to work in connection with the Foundrymen's Association and to provide a large number of exhibits at future conventions.

Associated Foundry Foremen.

A business meeting of the Associated Foundry Foremen was held on Monday evening, June 4, at the American House, the various officers making their reports. The secretary showed a membership of 334, with ten associations. On the whole the organization was shown to be in a healthy condition. The president and others made a strong plea that all bear in mind the purpose for which the association was organized, namely education. The following officers were elected for the ensuing year:

President, Hugh McPhee, Bridgeport, Conn.
First vice president, Hugh McKenzie, Cleveland, Ohio.
Second vice president, A. T. Williams, Philadelphia, Pa.
Secretary-treasurer, F. C. Everitt, Trenton, N. J.

A Brass Association.

During the convention Dr. Richard Moldenke brought before the delegates the formation of a Brass Foundrymen's Association, and a committee was appointed consisting of Charles J. Caley, president, and Dr. Moldenke, secretary, to take steps to form such a society, and to complete the organization at the next meeting of the American Foundrymen.

The Smoker.

One of the attractions which will be remembered was the smoker. Every one received a stein, a corncob pipe and a sack of tobacco and were instructed to use them. A cupola which was part of the exhibits reversed itself by becoming a refrigerator, for when tapped there flowed forth cool beer instead of red hot iron. It took a larger number of stein ladles to draw off the charge than is customary in general foundry practice. During the convention there was both rain and hot weather, but the convention ended with the spirit of the song that "it is always fair weather when good fellows get together."

300,000,000 POUNDS OF BRASS.

The prosperity of the brass rolling mill industry is shown by the recent statement of "one who knows" that in the year 1905 the American Brass Company sold 208,000,000 pounds of brass in the form of sheet, rod, wire and tubing, and that in 1906 they expected to crowd pretty hard the total output of 300,000,000 pounds. The headquarters of the American Brass Company are at Waterbury, and they control the following mills:

The Coe Brass Manufacturing Company, Torrington, Conn.

Waterbury Brass Company, Waterbury, Conn.

Benedict & Burnham Manufacturing Company, Waterbury, Conn.

The Coe Brass Manufacturing Company, Ansonia, Conn.

The Ansonia Brass and Copper Company, Ansonia, Conn.

The Chicago Brass Company, Kenosha, Wis.

The proposed establishment of an American branch factory of the Avery Scale Works of Birmingham is reported by Consul Halstead. It will be located at Milwaukee.

ART IN BRITISH JEWELRY.

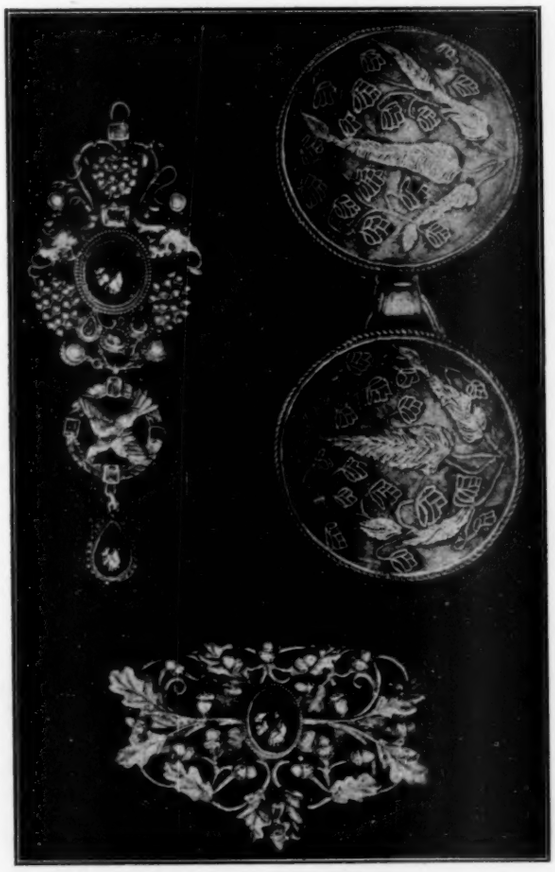
A Successful Birmingham School.

By J. Horton.

Birmingham, Eng., which claims to be very much alive to the value of technical education and which has all sorts of technical schools, is especially proud of its School for Jewellers and Silversmiths. This is situated in Victoria street, in the heart of the jewelry quarter; has been extraordinarily successful in winning gold and silver art medals, and in realizing a high standard of skill in its pupils, while in certain directions it claims to have struck out a new line for itself. A remarkable feature of the school is that while it is a branch of the municipal School of Art it is worked by a joint consultative sub-committee which includes several leading jewelers representing the Birmingam Jewellers' Asscoiation. It is "specially intended," according to the chief promoters, "for those engaged in jewelry and kindred trades, such as brass-workers, chain-makers, chasers, clerks, damasceners, designers, die-sinkers, enamelers, engravers, goldsmiths, jewellers, jewellers' case-makers, lapidaries, makers of electro-plate, mounters, repousse workers, setters, silversmiths, stampers, tool-makers, travelers, warehousemen, and any others connected with the metal trades," other students being admitted "as far as space allows." It will be seen the doors are opened wide enough, and in proof that it attracts the right sort of students is the fact that out of its 600 students 98 per cent. are youths and girls actually engaged in the jewelry trades themselves. The scope of its working and its method of operation thus become matters of importance to the industry itself, and of interest to a much wider circle.

APPLICATION OF NATURAL DESIGN TO JEWELRY.

DAMASCENING—FIRST EXERCISE IN NATURAL DESIGN.



APPLICATION OF NATURAL FOLIAGE TO JEWELRY.

The first impression on visiting the institution is one rather of surprise. Here, for example, is a youth drawing a sketch of a live duck in a cage; at another desk sits a young lady reproducing with a pencil the forms of a dainty pair of doves, and near her a student is intently studying the motions of a group of goldfish. A couple of small rabbits calmly sleep on the table in the centre, quite unconscious of their contribution to the progress of industrial art. In other parts of the building are guinea-pigs, mice, linnets, a hen and chickens, and other specimens of animal life, while perched in crocks or vases are sprigs of holly, laurel leaves, clematis, hop, or small branches of wild rose, oak, chestnut, hawthorn, laurel, nightshade and chrysanthemum. All these are "live" copies, which it is the chief vocation of the students to reproduce. Strewn about the tables are plaster of paris tablets showing with surprising exactness the forms of the various plants used in the school. These are intended for use when the originals have run their course and have found their final resting place under a pall of winter snow.

EXERCISE IN ENGRAVING ON COPPER FROM NATURE.

So far there is little to suggest jewelry, but the exploration of an upper story reveals a comprehensive collection of miniature hearths, vises, blow-pipes, soldering-slabs, and all the equipment of the goldsmith's factory. At these benches some fifteen or twenty students are at work, slowly collecting and attaching the constituents of brooches, pendants, and other ornaments in accordance with a design embodying acorns, oak-leaves, ferns or other forms of foliage.

The young workers handle their tools with facility, but the best evidence of their skill is the comprehensive collection of specimens stored in a large cupboard in

the principal room. The comparatively subordinate place in the establishment assigned to actual workmanship naturally suggests inquiry as to the method of operation and on this point Mr. Arthur J. Gaskin, the headmaster, during an interesting chat, dilated with some frankness. The Jewellers' School, it seems has been the arena of a curious educational experiment. Years ago, the technical department was under the control of the Jewellers' Association, while the art classes were managed by the Municipal Art Committee, which from time to time drafted students into the technical department. After some years' experience this was found to be unsatisfactory in its results, the Jewellers' Committee frankly confessing that in following the example of the strictly technical schools which work so well in Germany they had made a mistake, since all the technical training required by the student is sufficiently taught in the employers' workshops. Henceforward the pursuit of art became the main object of the school. But care was taken at this stage

BROACH CLASP IN WROUGHT STEEL WITH DAMASCENE ORNAMENT.

to appoint as master a draughtsman having an intimate acquaintance with metal work. This requirement was fully met in Mr. R. Catterson Smith, a sculptor, painter and draughtsman who had worked side by side with Sir E. Burne-Jones and Mr. William Morris. He has since been succeeded by Mr. Arthur J. Gaskin, whose qualifications are very similar to those of his predecessor and who steadfastly and enthusiastically follows the same ideals.

"What we seek to do," said Mr. Gaskin, "is to train the hand and eye of the boy who means to go into the trade. Suppose, for example, a boy is set to make a brooch or pendant—he has no knowledge whatever of any structural form in nature, and if he can't draw it with a pencil, how is he to execute it with his tool? The great thing we teach him to do is to draw, and we seek to make the boys quite fine draughtsmen. We think that is the best service we can render, and if the boy really has genius for work as a goldsmith or silversmith, there is no knowing what help that will be to him. The most vital point in our method of instruction is that the boys draw from life with the plants, which we get fresh for them three or four times a week, and all sorts of animated creatures—birds, animals, frogs, fishes, and what not. There is plenty of ability in the students, but unless they have this sort of training their work has no life-like resemblance and is very apt to be dull, dead, and conventional. The boy must make his pencil express what the eye perceives. Everything depends upon developing the student's perceptive faculty and power of analysis, and when the boy has learnt to faithfully reproduce the life with his pencil, the most vital step has been taken towards its metallic reproduction with his tools."

So much for the principles governing the school's operation. It will be seen that everything is done to utilize natural forms, on the ground that, as the programme of the school expresses it, "Nature supplies

CHIPPING IN BRASS FROM NATURAL DESIGN.

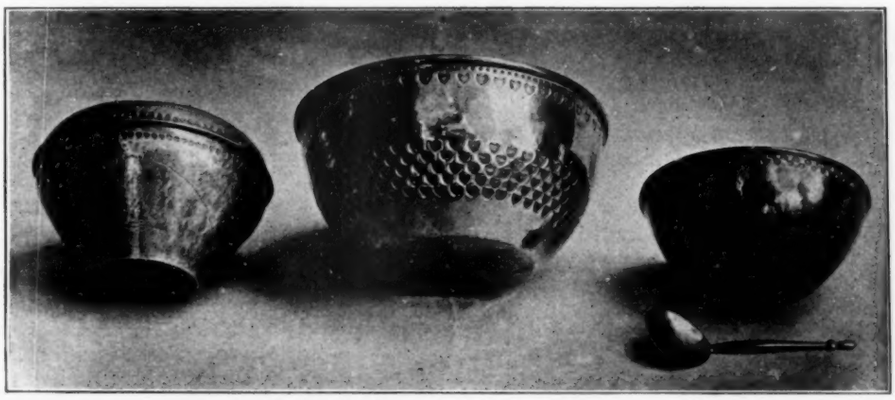
an infinity of forms and suggestions quite unimaginable to those who have not studied her." Such study has a powerful effect in bringing out individual talent and developing capacity. As to the results achieved we are able to give illustrations of some of the specimens of jewelry wrought by the students. Admittedly no masterpieces have been produced, but the work shows a very promising standard of excellence.

Mr. Gaskin exhibited a cleverly wrought damascene belt, a number of copper bowls, tea-pots, pendants, and examples of leaf-chiseling very creditable to the students. There are beautiful examples also of copper repousse, as well as of acorn and oak-leaf decorations, which show sound taste in design, as well as dexterity in execution. The examiner, Mr. H. Wilson, in his recently issued report, speaks very warmly of the progress of the school, "in respect of clean workmanship, neatness of execution, greater appreciation of the beauty of metals in combination, while the inlay and Damascening work is of a very promising character." The studies of animals and

birds are referred to with enthusiasm by Mr. Wilson, who warmly commends the "freshness of outlook, vivacity of expression, and the more or less complete realization of superficial form and texture." The students take great pleasure in their work. This largely accounts for their success.

In regard to practical results, the following important declaration may be quoted: "The effect of the study of plant-form in the general improvement and increased refinement of execution in the goldsmith's and jewelry classes is very evident and very delightful to see. It should be a source of the keenest interest to all concerned to watch the growth of knowledge acquired under their guidance, and to observe the happy results produced by the use of leaves and fruits in repousse assembled and wreathed together with twigwork. The school is daily becoming a centre of happiness in work, and work and happiness combined are the most potent of civilizing and ennobling influences."

Specimens of jewelry work commended by the examiner are quite too numerous to mention. They comprise bowls, sugar tongs, pendants, brooches, rings, crosses, buttons, and hat-pins. Occasionally the examiner indulges in some severe criticism, but generally he expresses the greatest satisfaction with the results achieved. It should be added that the Department for Enameling, Engraving and Damascening is presided over by a practical workman, with an assistant, the department for repousse raising and chipping and that of mounting, carving and setting being similarly equipped, except that in the two latter cases there are a couple of assistants.



RAISING AND TOOLING IN COPPER.

A very important new departure will probably be taken shortly. At present the fees are very moderate, but it is proposed to go a step further and grant free admission to promising children taken direct from the elementary schools. The object is to precede their working career with one year's training. This will involve a revolution, as it will enable the schools to be practically fully occupied during the daytime as well as in the evening, and will furnish a source of supply to jewelers in search of trained recruits. At present no such source of supply exists.

THE GREAT DEMAND FOR COPPER.

The price of copper recently attained the highest position since the Secretan corner in 1888. This is due to the extraordinary use of the metal for electrical purposes. Efforts to find a substitute for copper in electrical work have met with little success. Aluminum is the only similar medium thus far discovered, but its price and output threaten no competition with copper. Many railroads are arranging for the electrification of suburban divisions, which will add another element of consumption.

The world's production is now stated to be 700,000 tons. The production in 1905 was 100,000 tons greater than the average for the last five years, while the latest quotation of about $418.51 per ton compared with the average of $301.72 for the last five years. Despite these almost sensational figures there are no excessive stocks in any position. While there has been an average yearly increase in production of 748 per cent for the last five years, practically all of the important gains have been supplied by this continent, and more than half the total increase occurred in the United States.

The output in the United States for 1905 was 397,909 tons. Spain and Portugal produced 48,000 tons and Mexico 60,000 tons; but there was an actual decrease in production by Spain and Portugal as compared with 1904, while the Mexican production has more than doubled since 1900. It is stated by experts that, taking the average increase in consumption during the last five years, 876,000 tons of copper will be necessary to meet the demand for the metal by 1910, and unless some substitute is found the requirements will reach 1,500,000 tons by 1920. The exports of copper from the United States are expected to increase enormously during the next few years.

The exports of copper in the month of March aggregated 38,462,661 pounds with an average of 17.6 a pound, as compared with 41,597,725 pounds, valued at 15.5 cents a pound in the corresponding month of last year. The greatest falling off in the March exports were those to China, where only 448,000 pounds were sent, as compared with 6,973,871 pounds in March, 1905.—U. S. Consular Reports.

PRECIOUS STONES.

Last year the people of the United States showed their fondness for precious stones by importing $34,998,513 worth. The total home production was only $326,350, of which the largest item was for sapphires, $125,000. We produced no diamond, ruby, opal or emerald, according to the report of George F. Kuntz in Mineral Resources of the United States. The report presents the production of precious and semi-precious stones of all countries.

THE FUNCTION OF THE ACID COPPER BATH.

By Chas. H. Proctor.

It hardly seems possible that the acid sulphate of copper solution is so little known among the plating fraternity. However, this seems to be a fact, although the solution has been used for electrotyping for more than half a century. Recently the writer was called in consultation with a jobbing plater, who had secured a contract for polishing and nickel plating a cast iron base which was to be used as a platform for a portable weighing scale. The usual roughing out and fining down was done with No. 100 to 150 flour emery and the articles were afterwards cleaned and nickel plated in the usual manner. They were then repolished, as is customary.

Upon examination the articles were found to be lacking in lustre and in color, and the nickel deposit appeared gray instead of having a lustre approaching that of a highly polished piece of nickel plated brass. After several trials the plater gave up the idea of being able to produce a finish upon the casting which would be anywhere near like the sample unless he spent two or three times more labor on the article than he had figured on. Even then he was doubtful of producing a sufficient lustre.

The writer realized that the finish had been produced with the aid of the acid copper bath and he so informed the plater. It is one of the particular functions of the acid copper bath to produce a heavy and dense coating of copper, so that when an iron surface had been finished copper coating will close down the fine lines and scratches under the coloring wheel and produce a surface which is equal in lustre to a highly polished brass or copper surface. Thus when nickel is deposited upon its surface and is afterwards polished, a beautiful color is produced.

Not only is the acid bath useful to this purpose, but also for producing heavy deposits for the various antique copper finishes which are now so much in vogue. Another prime factor to be considered is the cheapness of the acid copper bath when it is compared with the cyanide of copper bath. Of much advantage is also the little care which is needed for the operation of the bath.

One of the best formulas the writer has ever used for the purpose mentioned above consists of one pound commercial copper sulphate, four ounces commercial sulphuric acid and one-half ounce of glycerine in each gallon of water used for solution. In making up the bath as little boiling water should be used as is needed for the solution of the copper salt. The other portion of cold water should then be added. The copper salt may also be dissolved by using a live steam pipe or coil and as little water as possible.

The anodes to be used for the bath may consist of soft sheet copper, or electrolytic or cast, and they should have as large an amount of surface as can be conveniently carried in the bath. The copper is very easily finished and even by using a soft brass wire scratchbrush a finish which approaches a buffed finish can be produced. It should be thoroughly understood that iron or zinc cannot be plated directly in the acid copper bath. Articles made from these metals should be coated for five or ten minutes in a cyanide of copper bath until they are coated all over uniformly. This method of procedure prevents the action of the solution upon these metals.

Lead alloys may be plated directly, but the results are more satisfactory when the articles are flashed momentarily in the cyanide bath. For many purposes a fifteen minute immersion in the acid bath is sufficient, but in plating iron one-half to one hour should be the rule, in order to procure a good lustre.

The voltage of the current may vary from two to six volts and good results may be obtained by using an amperage equivalent to that used for nickel plating. In the production of ormolu gold the acid copper deposit is rapidly passed through the bright dipping acid. This procedure gives the semi-dead lustre and when burnished on the relief parts and gilded in a good yellow gold bath it produces the ormolu gold, which has been so much in vogue in the past few years.

The plater mentioned above had never used an acid bath and scarcely knew the meaning of the term, although he heard platers mention the "sour copper," the "blue bath" and the "acid copper" solution, which are all names by which the bath is known among that part of the plating fraternity which has a knowledge of its value.

THE SPOTTING OF PLATED CAST IRON.

Sometimes cast iron goods electroplated in the usual cyanide solution develop minute specks, like rust marks, after the work has been finished and lacquered. The specks are evidently caused by small pin holes in the metal. These holes, expanding under the influence of the depositing solution, retain some of the salts in the pores of the metal. The stains come to the surface, more especially during the summer months when the atmosphere is heavily charged with moisture. Great care is necessary in thoroughly washing the articles before finishing and lacquering.

For a preventive add cream of tartar to the boiling rinsing water until it is slightly acid, or until it turns blue litmus paper slightly red. Then after washing well in cold and boiling water, immerse the articles for 5 or 10 minutes in the boiling cream of tartar water and dry out directly from this in the usual manner. It is advisable, also, before lacquering to have a warm lacquer heated with a lead steam coil and immerse the articles in this liquid for a few minutes. The stains should not then appear.

SPECKS ON CASKET PLATES.

A silver plated article may appear to be perfect as it comes from the buff room, and after it has been plated, and yet develop imperfections in the final finishing. An examination of the unfinished plate under the microscope will sometimes reveal a granular structure of the metal, and there may be very minute pinholes. While these may be infinitely small they have a tendency to expand by the heat produced and probably absorb some of the polishing material. The deposit covers them up but leaves small white specks which detract from the clearness of the finish in the final stages. Other causes may be a solution which is poor in metal, or too much acid in the solution, or an excess of cyanide.

MARBLEIZED FINISH ON SILVER.

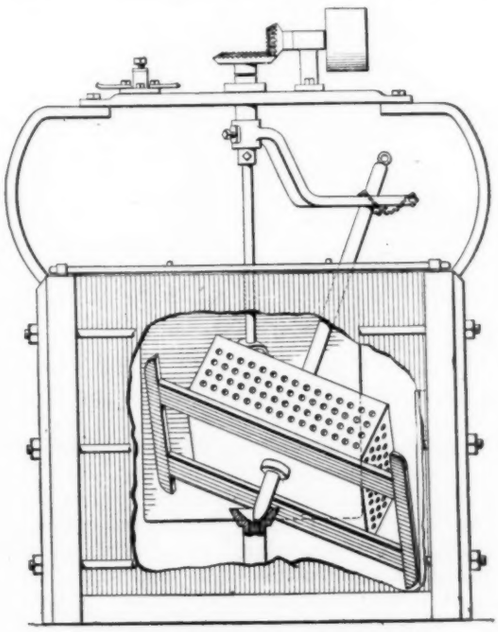
Very beautiful marbleized effects can be produced upon silver or silver plated goods by following these directions: After removing the articles from the bath and washing and drying, they should be lightly gone over with a good sized feather dipped in hydrosulphuret of ammonia. When the dead surface of the silver has been sufficiently marbleized, wash in cold water only, and dry without using heat. Then lacquer with a transparent lacquer. Still more variegated effects can be had by using a 10 or 15 per cent. solution of caustic soda with warm water to which should be added as much pulverized sulphur as the solution will take up. Then proceed in the manner just mentioned.

INDUSTRIAL

NEW AND USEFUL MACHINERY, DEVICES, APPLANCES AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

NEW ELECTRO-MECHANICAL PLATING APPARATUS.

An electro-plating apparatus for the electro-mechanical plating of small articles has just been invented by Herman R. Boissier, which, it is asserted, differs from any of the present forms of machines which have been invented for this purpose. It will be seen from the illustration that instead of the articles being contained



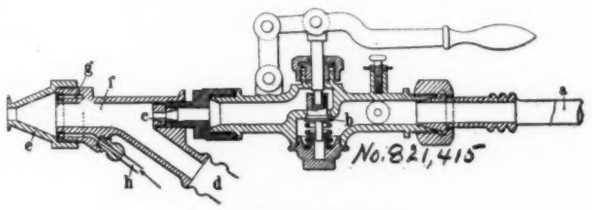
VERTICAL SECTION OF APPARATUS.

in a rotating vessel they are put into a perforated box, which is spun round like a top, the advantages of which are claimed that it forms a positive contact with the work, the pivot rod acting as one of the poles. The advantages gained with electro-mechanical plating apparatus—no stringing, no wires, nor metal plating trays—apply to the Boissier invention the same as others. It is manufactured and marketed by the Boissier Electric Company, 478 Pearl street, New York City. The patent has been allowed.

NEW SAND BLAST MACHINE.

The sand blast machine is a piece of apparatus which has become indispensable nowadays for the quick finishing of certain classes of metal goods, and that this apparatus is receiving the attention of the mechanical minds is shown by the number of patents which are continuously being issued on sand blast apparatus. Charles A. Hess, a citizen of the French Republic, residing at 5 Avenue de l'Opera, Paris, France, on May 22, 1906, has received U. S. Patent No. 821,415 for the sand blast machine shown in cut.

In describing his invention the inventor says that in certain machines the same current of compressed air sucks the sand and at the same time projects it against the surfaces to be scraped or cleaned, there is produced within the projector an agitation or eddy due to the fact that the operations of the suction and projection of the sand are simultaneous and not successive. In order to obviate this defect a device is employed which permits of separating the suction and the projection which is accomplished through the compressed air entering through a, passing through the valve b,

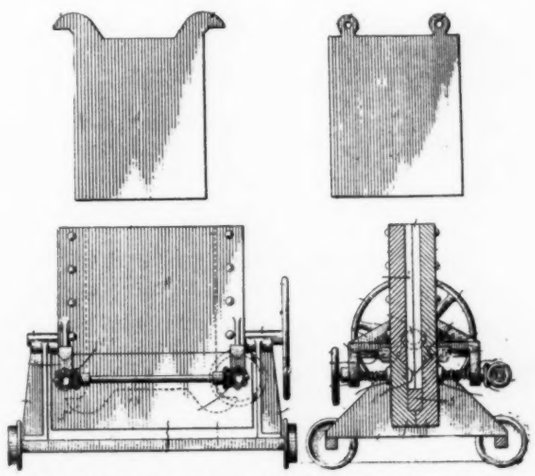


SAND BLAST MACHINE.

issued through the air ajutage c, where it sucks the sand coming from the sand box through the pipe d. The mixture of air and sand takes place in the mixing chamber f, and is projected by the projection ajutage e. At this point is arranged an excess pressure device, which gives the blast the advantages claimed above.

MOLD FOR CASTING ANODE PLATES.

At the present time it is the common practice to cast anode plates in shallow, flat, open molds; they are, in consequence, considerably warped and twisted and have to be hammered flat before they can be used. Being cast in open molds and without a head of fluid metal, they are of irregular thickness and subject to flaws which, as the plates become reduced in thickness, cause portions to break off. In order to overcome these difficulties Richard Truswell, of Trail,

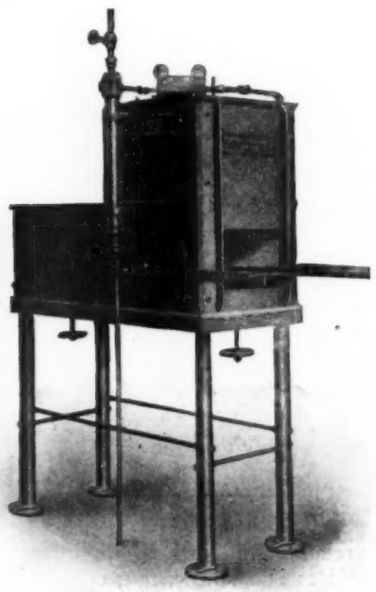


ELEVATION AND SECTION OF MOLD AND PLATES.

Canada, has designed a mold in which the plates can be cast on end with the upper part or head of the plate down, thus insuring a sound flat plate of uniform thickness and free from flaws, particularly in the upper part. The mold is supported on trunnions on a truck which, after casting, can be run out into the tank room, the mold inverted and the portion inclosing the head opened, when the plate may be withdrawn in a condition ready for immediate use.

TUBE BRAZING FURNACE.

About a year ago the Rockwell Engineering Company, of New York, brought out the tube brazing furnace here illustrated, designed for operation with either oil or gas for fuel. The furnace was installed in one rolling mill and gave such satisfaction that a number of mills have since ordered a like equipment and others are asking for particulars. It is intended especially for brass, copper or steel tubes.



TUBE BRAZING FURNACE.

The burner discharges a ribbon of clear, hot flame from the top down upon the tubes, with an inclination toward the rear. The brazing point is near the front in full view of the operator and all the valves are within easy reach of his left hand. He has perfect freedom to regulate the fire to suit the work and can draw the tubes forward without changing his position. The escaping gases pass out the rear, warming up the incoming tubes. By means of adjusting screws the bottom of the chamber can be raised or lowered to accommodate tubes of different sizes. It will braze 50 per cent. more tubes than a coal-fired furnace.

FOUNDRY AND ENGINEERING EQUIPMENT.

The W. W. Sly Manufacturing Company, of Cleveland, Ohio, are now located in their new plant at the corner of Train and Junction streets, and are again preparing to enlarge by the erection of an addition for the manufacture of their dust arresters. They will also build a foundry for their own castings. At present they are making their crushers in eight sizes and for which there is a constantly increasing demand. During the past year they put in $10,000 worth of new machinery in order to handle this work and were forced to build their own rolls in order to work the heavy steel going into their mills. They are now working on two mills for the Henry R. Worthington Company, which will weigh when completed about 10,000 pounds. They are making dust arresters for purifying the air for air compressers and shortly expect to equip blast furnaces with these arresters. By this means they will take the dust out of air before it enters the blowing engine, therefore preventing the cutting of the cylinders. Their motto is to excel in everything they make.

IMPROVED CAST DIES.

For many purposes steel dies are too costly and bronze dies, while costing less, will not stand the wear when used for stamping brass and silver. The next best die is one of cast iron, which is unsatisfactory, being rough and spongy.

John Roth, of 59 Lake street, Jersey City Heights, N. J., has designed a new method of making cast dies which are as sharp as the pattern and require but little touching up. The grain is closer than cast iron and small marks in the die can be overchased; the die sinker can work it better, as it is not so brittle and spongy. Another advantage is that these dies cost much less than steel, since the expensive metal, or that of which the die proper is made, is only a small proportion of the weight of the entire die.

In the making of these dies the die proper is cast separately from the main or body portion. The under side of the die corresponds with a recess formed in the top of the die block, but a small space is left between the two. The chamber thus formed between the die block and die is filled with metal through a casting hole at one point in the circumference of the die. By this means the die block and die are firmly united into one structure. The die is made of superior metal or alloys, such as nickel steel, aluminum bronze, and the like, by which a more durable die is obtained and one which will faithfully reproduce the ornamentation.

FORMULAS FOR RED COPPER COMPOUND.

The Finkell-Hachmeister Chemical Company, of Pittsburgh, Pa., issue the following particulars about the use of their 100 per cent prepared red copper, which red copper, they say, contains three times more metallic copper than the carbonate or acetate combinations and can be prepared for use in 15 minutes' time. The following is a formula for a quick working copper solution for 75 gallons and which gives excellent results:

Red copper	10 lbs.
Potassium cyanide	12 lbs.
Water	75 gals.
Sodium bisulphite	10 lbs.

Dissolve the 10 lbs. of copper in 5 gallons of water, add potassium cyanide in pieces and stir until all cyanide has been dissolved; dilute with 65 gals. water and add sodium sulphite dissolved separately in 5 gals. water.

The electrolytic deposit is of a beautiful red color, very adhesive and durable and a coat of great thickness can be deposited in a short time without danger of blistering. This solution is especially valuable for plating of iron, steel, zinc or tin, as it contains no ammonia whatever, thus excluding the danger of oxygen being formed between the base metal and the deposit, which is mostly the cause of non-adherance and peeling off.

Old copper solutions (neutral or alkaline) may be directly fixed up with the following strong solution; no matter what they contained originally:

1 part copper.
3 parts cyanide.
10 parts water.

Prepared red copper represents one of the best ingredients for a copper bath on account of its purity, metallic contents, celerity and durability of deposit, and it is highly recommended by the leading platers throughout the United States.

ADJUSTABLE EMERY WHEEL DRESSER.

The only adjustable emery wheel dresser on the market is being introduced by Patterson, Gottfried & Hunter, 146-150 Centre street, New York. It is intended to work on the rest in front of the wheel and be moved

ADJUSTABLE EMERY WHEEL DRESSER.

back and forth on the face of the wheel. In this way the high spots are taken off and at the same time the face of the wheel straightened. The dresser possesses another advantage over others in that the man operating the machine stands at one side instead of in front of the wheel, thereby avoiding injury from flying emery or from

ADJUSTABLE TAP WRENCH.

the wheel in case it breaks. The tool takes the ordinary emery cutter so that the original one may be replaced when worn out. As shown in the illustration the tool is adjustable to any size rest.

RATCHET TAP WRENCH.

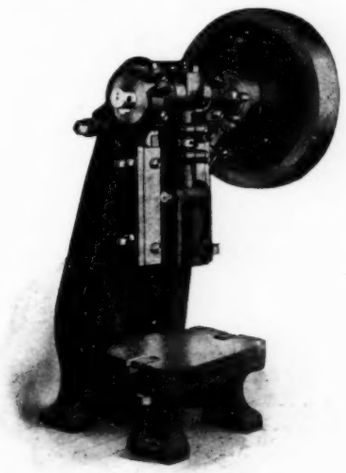
The same firm also build the tap wrench here shown. The handle is securely fastened in the socket as shown in the cut, and the end of the chuck fits into this and is held in place by a small set screw. The end of the chuck portion has two grooves cut at right angles, thus forming four teeth. These teeth engage with that portion of the handle which passes through the head, thereby providing a very simple ratchet movement. The wrench is about 3½ inches long and the tee handle is about 2½ inches long, thus giving a good grip.

The total production of the British Columbia mines for 1905 was valued at $22,461,325. Gold ranked first with $5,900,000; copper next, with $5,876,000; lead, $2,399,000, and silver $1,971,000.

In 1885 the total production of zinc in the United States amounted to only 40,688 tons, but in 1905 more than 200,000 tons were produced. Imports of zinc in block form fell from 3,515,840 pounds in 1885 to 682,523 in 1904, while those of sheets decreased from 1,859,860 pounds to 34,385 pounds. Colorado is coming rapidly to the front as a producer of zinc ore.

SMALL BLISS POWER BENCH PRESS.

To meet the demand for a small power press to do the work that was formerly done in foot presses, the E. W. Bliss Company, 23 Adams street, Brooklyn, N. Y., has designed and built the small machine shown in the accompanying illustration. It is particularly adapted for light work and is used in the manufacture of burners, light jewelry, and for small hole punching, blanking and forming. While the total weight of this press is only 250 pounds, special attention has been given to the design so as to provide a strong, compact frame, yet with sufficient die space to accommodate dies of quite some size. The general lines of the press are similar to the regular Bliss inclinable presses, although some slight changes have been made because of the small size of the machine. It is fitted with the Bliss two-piece clutch which is practically instantaneous in its action, and the wheel, which has a solid web, is bronze bushed.



SMALL BLISS FOWER BENCH PRESS.

The way these presses are turned out is very interesting. They are made in large quantities with jigs and gauges so that every piece is interchangeable. This reduces the cost to a minimum and permits the press to be put on the market at a very low figure.

The principal dimensions are: Opening in bed, 3 inches diameter; distance back from center of slide, 3 inches; width of opening in back, 4 inches; distance bed to slide, and stroke down and adjustment up, 5 inches; stroke of slide, 1 inch, although the stroke can be made 2 inches if desired; diameter and face of flywheel, 13 by 2¼ inches; weight of wheel, 50 pounds; speed, 150 to 200 revolutions; area of top of bolster plate, 6 by 9 inches; height to center of shaft, 20¼ inches; bench space over all, 16 by 16 inches.

A LONG LIVED CRUCIBLE.

A long lived crucible is on exhibition at the office of The Joseph Dixon Crucible Company, Jersey City, N. J. The crucible, which is a No. 70, was put through 81 heats at the plant of the Bristol Brass Company, Bristol, Conn., this breaking the company's record. The greatest number of heats recorded before was 78, at the plant of the Lumen Bearing Company, Buffalo, N. Y. As in the long life of an individual, it is particularly good care as well as good make which makes the crucible last.

CORRESPONDENCE

IN THIS DEPARTMENT WE WILL ANSWER ANY QUESTION RELATING TO THE NON-FERROUS METALS AND ALLOYS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

METALLURGICAL.

Q.—Will you kindly tell us in the columns of your next publication what proportions of tin and other metals are contained in block tin pipe?

A.—Block tin is the pure metal without alloy. However, all pig tin will contain traces of lead, as well as silver, arsenic, antimony, copper, iron and sulphur. Sometimes traces are found of nickel, manganese, zinc and tungsten.

Q.—On account of the continued high cost of tin we are experimenting to find a composition, same characteristics as the following mixture, but less expensive:

Copper	45	lbs.
Tin	6½	"
Zinc	1¼	"
Lead	2½	"

While the above mixture is quite hard on tools we are willing to suffer this expense, but we can stand it no harder. Will you suggest a mixture which will be as stiff and easily machined, and no more readily attacked by alkali?

A.—The following formula should give you very nearly the same results as the formula mentioned in your inquiry:

Copper	90	lbs.
Tin	5	"
Zinc	10	"
Lead	2	"

Q.—Would you kindly publish a good formula for small cores?

A.—A good formula for small cores is:

Dead sand	1¼	oz.
Beach sand	1	"
Flour	⅛	"

Mix with beer.

A good plan is to smoke the cores, for by so doing they will leave the castings free and clear.

Q.—We want something to make our yellow brass run sharp and close.

A.—One method is to use ¼ of 1 per cent. of aluminum. Be sure to thoroughly skim and stir your metal, before pouring; ¼ of 1 per cent. of aluminum will not affect the dipping of yellow brass castings if they are first given a good immersion in potash, but be careful not to add more than the quantity of aluminum mentioned.

Q.—Will you kindly let me know a good formula for Britannia solder, one that is very easy flowing?

A.—Two good formulas for Britannia solder that are very fusible and easy flowing are the following:

Tin	2 parts
Lead	1 part
Bismuth	1 part

or

Tin	3 parts
Lead	4 parts
Bismuth	2 parts

Q.—Will you kindly give me a formula for a silver solder which flows rapidly and has a yellow appearance, as all the solders I know do not flow fast enough?

A.—Two good formulas that have stood the test are:

Fine silver	6 oz.
Copper	2 oz.
Bertha spelter	1 oz.

A cheaper mixture that is yellow in color, but gives good results, is:

Fine silver	3 oz.
Copper	2 oz.
Bertha spelter	1 oz.

PLATING AND FINISHING.

Q.—Kindly inform us of a good lubricating oil for cutting iron pipe.

A.—Any good oil will do the trick. Lard oil is the best, but is rather expensive. Soda water is good, but it gets into the machine.

Q.—We have made lately some anodes from our nickel scrap such as plating hooks, plating baskets, old anodes, etc., and we find the results far from satisfactory, the anodes turning the solution and the work black. The mixture we have used is about one-third old anodes to two thirds of the other scrap. Can we use this scrap with some other mixture, and if so how can we mix it to get the results required and if not what can we mix with it?

A.—Probably the nickel anodes you have produced from scrap and old plating baskets contain some copper, which would produce a blackish deposit, for even if present in very small quantities it has a tendency to discolor the solution. In making anodes from scrap it is well to cast them first in ingots and then re-melt and cast into the shape desired for anodes. By adding 4 to 5 per cent of iron and the same amount of tin an anode is produced that is much softer and reduces easier in the solution than one made exclusively from nickel.

Q.—Kindly print receipt for a Roman gold solution that will plate almost cold and give a light yellow color for enamel jewelry. If I use a hot one it chips the work.

A.—For a Roman gold solution to be used at a temperature less than 100 degrees, try the following formula:

Water	1 gallon.
Phosphate of soda	8 oz.
Sulphite of soda	2 oz.
Cyanide of Potassium	8 dwt.
Pure gold	5 dwt.

(Or ½ oz. neutral chloride of gold.)

Anodes of 24 karat gold or platinum sheet may be used. When using pure gold it should be understood that it must be converted to chloride of gold by dissolving in aqua regia and evaporated in the usual manner.

Q.—Will you kindly furnish me with a formula for a good 18 kt. gold solution that will give a heavy deposit that can be finished by buffing instead of burnishing? I should also like to know a good book on plating—one that is up to date.

A.—For an 18 kt. gold solution dissolve 10 oz. cyanide of potassium, 98 per cent., in 1 gallon of water; then add ½ oz., troy, of neutral chloride of gold; mix thoroughly and heat to 160 deg. Now dissolve ½ oz.

carbonate of copper in 1 oz. cyanide and add sufficient of this to produce the desired color. Use a 14 or 18 kt. anode with this solution.

Send for a list of THE METAL INDUSTRY books and special offer to subscribers. All of THE METAL INDUSTRY books are up to date. Two of the most popular are "Metal Coloring," by Hiorns, and "Polishing and Plating of Metals," by Hawkins.

Q.—Please give me a formula for a 1 gallon solution that will plate very black on brass and copper; I do not want a black nickel solution.

A.—Dissolve ½ lb. white arsenic, 1 oz. sulphate of copper and 1 lb. of cyanide of potassium in 1 gallon of water. Use anodes of iron or carbon with a strong current. This produces a good black on brass and copper.

Q.—Please give me information of how an orange-gray gilding may be obtained on silver and its alloys.

A.—The orange-gray gilding, so called, is produced by first silver plating the articles, then scratch brushing and finally gilding in a good gold solution for a few seconds to get a blush of gold. The gold is removed from the relief parts by using a fine steel machine scratch brush with a little pumice stone and water. This produces the silver gray effect with the orange gold. The articles should be coated with a transparent lacquer.

Q.—Will you please advise me of a burnt black finish that will stand government inspection?

A.—We do not know of a burnt black finish unless you have reference to the bower-barff finish which is produced on iron only by heating the metal in a closed retort to redness and then injecting live steam. This forms a black coating that is permanent. The black bronze finish specified in government contracts is nothing more than a rubber finish lacquer applied to a surface that has been slightly coppered and oxidized with liver of sulphur to give a good background for the lacquer. This coating dries hard and with a dead black finish approaching bower-barff. All goods made by the General Electric Company for the U. S. Government are finished in this manner. The Egyptian Lacquer Company's official black and rubber finish lacquers are government standards, although other makes of the same grade may be used.

Q.—In lacquering brass plated goods with gelatine lacquer we find they become spotted; but while using the same lacquer on solid brass articles they come out very nicely. We do not understand this and request information.

A.—The spotting of the brass plated articles is due to the metallic cyanides used becoming impregnated in the pores of the metal. Wash thoroughly and immerse in a slightly warm solution of sodium bisulphite, 2 oz. to the gallon of water. This will neutralize the cyanide. Wash well and proceed in the usual manner.

Q.—I should like to secure the formula for a cement of glue to stick thin sheet brass to hard rubber.

A.—One of the best formulas we know of for cementing hard rubber to brass or other metals is the following: Soak pulverized gum shellac in ten times its weight of 26 per cent. water ammonia. This produces a pasty mass which, when tightly corked, becomes liquid in two or three weeks without the use of hot water. This softens the rubber somewhat and after volatilization of the ammonia it becomes hard and impervious to gases and fluids. It is applied in the usual manner.

Q.—Can you advise us of a formula for dip gilding or gilding by immersion; something practical.

A.—For gilding by immersion use a boiling solution consisting of:

Water	1,000 parts.
Sodium pyrophosphate	80 parts.
12 per cent solution hydrocyanic acid	8 parts.
Neutral chloride of gold	2 parts.

Dissolve in the order named. The articles for gilding must be thoroughly cleaned. The solution may be maintained constantly by adding chloride of gold, as occasion requires it and a small amount of hydrocyanic acid. Care should be used in handling the acid as it is a deadly poison.

Q.—A few months ago I made the following solution, which I got from your paper, to oxidize brass: Dissolve ½ lb. white arsenic and 1 lb. caustic soda in 1 pint hot water; and 4 oz. sulphate of nickel in 1 pint water. Mix the two solutions and then add ¾ gal. commercial hydrochloric acid. A nickel anode should be used. I then added water until I had about 8 gals. of solution. It does not work right; it plates spotted and in streaks.

A.—Too much water was added to the formula given. The proportions mentioned were for 1 gal. of solution. For 8 gals. the quantities should be increased eight times. For the streaks and spots mentioned add more acid in the proportion of 2 parts acid to 1 water. If this does not remedy the trouble, it will be necessary in increase the arsenic and nickel in the proportion of ½ lb. arsenic and 4 oz. nickel to the gallon. This may be dissolved direct in the acid by heating the acid to at least 180 degrees.

Q.—The manager where I am employed had a lot of scrap nickel and wished to place it back in the nickel tank. He tied the anodes together with wire solder. I told him not to put it in the tank, and he agreed with me. Would there have been any bad results.

A.—We do not think so. The lead would not deposit and the tin has a tendency to produce whiter nickel. It is added to a certain extent in the casting of nickel anodes to produce a softer and easier reducing metal. Iron wire may be satisfactorily used in connecting scrap pieces of nickel when desiring to use them as anodes without any bad effect. All nickel anodes contain a certain per cent of copper.

Q.—Please give me a dip solution for a black on soft white metal. I want to rub through to imitate silver oxidize.

A.—To get a good black oxidize on soft white metal it will be necessary to give the articles a flash of copper in the cyanide of copper bath. Then use a hot solution of sulphuret of potassium 1 oz., ammonia, 26 per cent., ½ oz., and water 2 gallons. Scratch and relieve the articles in the usual way. This will give a good imitation of oxidized silver.

Q.—I have a solution of about 400 gallons, 3 feet deep, made of chloride of silver. It stands now 15 hydrometer. A scum forms on the iron wires that hold the anodes. The anodes act all right and remain white. I added chloride of silver, which appears to have caused the trouble, as iron wire did not act that way before. Will it right itself in a few days or get worse if I let it alone?

A.—We would advise you to leave the solution alone if it is working correctly. The black formation noticed on the iron anode hooks is probably caused by a slight content of nitrate of soda in the solution. It is advisable, when preparing chloride of silver from nitrate, to use muriatic acid to precipitate the silver instead of common salt. By doing so the precipitate is free from sodium nitrate; but when salt is used the sodium nitrate stays in and it is almost impossible to wash it out.

CRITICISM AND COMMENT

WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ALL ARTICLES PUBLISHED IN THE METAL INDUSTRY.

IMPURITIES IN AMERICAN COPPER.

To the Editor of THE METAL INDUSTRY:

An article by Mr. Ernest A. Lewis, in your issue of June, page 133, contains some figures relative to the percentage of impurities in copper which might prove misleading to buyers of American brands of the metal. Such amounts as 0.5% of arsenic, 0.25% antimony, 0.1% iron, and 1.0% of nickel are mentioned as impurities. Ingots of Lake copper seldom carry less than 99.80% copper, leaving at the most only 0.2% for all impurities. Silver and oxygen are present in Lake copper to the extent of from 0.1 to 0.15%, and these are regarded as not only harmless, but beneficial impurities. This leaves, in general, only from 0.05 to 0.1% for the harmful impurities, such as arsenic, antimony, bismuth, etc. The following analyses, by Mr. Geo. L. Heath, chemist, Calumet and Hecla Smelting Works, show the amount of impurities to be expected in good brands of Lake copper:

	Copper	Silver	Arsenic	Iron	Sulphur
Sample No. 1.....	99.879	0.071	0.0006	0.0014	0.0022
Sample No. 2.....	99.867	0.068	0.0004	0.0027	0.0006
	Zinc	Nickel	Antimony	Lead	Oxygen
Sample No. 1.....	Trace	0.001	Trace	——	0.045
Sample No. 2.....	0.0005	Trace	None	0.0011	0.064

As for electrolytic copper, this is even purer than Lake, usually carrying about 99.9% copper, oxygen being the chief impurity. The average purity of cathode copper, before remelting, is, according to Mr. Lawrence Addicks, 99.93%. Cathodes of this purity could be used for making brass and copper castings.

Electrolytic copper to-day surpasses all but a few brands of Lake in conductivity, and the respective merits of the two regarding mechanical properties is a subject in dispute. The electrolytic people claim that those Lake brands showing up better under strain contain impurities, arsenic, for example, which harden the metal. The Lake smelters, on the other hand, compare the copper business to the textile industry: Lake copper, the virgin metal melted down, is comparable to good cloth made from new wool; electrolytic copper, subjected to half a dozen metallurgical processes and chemical combinations, has its analogy in poor cloth made from shoddy. The relative value of these arguments is left to the judgment of the reader.

ANDREW M. FAIRLIE.

NEW BOOK.

Burns Pipe Price Extender, by Eugene Burns. 3¾ by 6½ inches. 32 pages. David Williams Company, Pubs., New York. This handy little volume provides a series of tables by which correct extensions at present list prices can be obtained of all sizes and amounts of standard weight black and galvanized merchant pipe. The tables are particularly valuable for calculating amounts when the quantities and prices are fractional.

It is predicted by metallurgical authorities that the supply of iron ores will be exhausted in 100 years, and one authority mentions that the next age may be aluminum. We trust that THE METAL INDUSTRY may be alive to rejoice in that age.

A MIRROR SURFACE ON FLAT METAL SURFACES.

To the Editor of THE METAL INDUSTRY.

In a general way the article written by Mr. Proctor in your May number on producing a mirror surface on flat metal surfaces is instructive, but I differ with him in some respects. Now, he would give the article or metal to be polished five operations, viz., two polishing wheels and three buff or cotton wheels. I would grind the flat surface on three wheels, viz., No. 60, No. 100 and No. 160 (the latter greased with mutton tallow and broken down nice and fine), then the piece would buff easier and much nicer and would not drag; it then could be colored up very nicely on one wheel, where Mr. Proctor would color on two wheels. I feel quite sure I would have a finer piece of work and easier produced. Mr. Proctor recommends as speed for cutting down, 2,000 or over, where I favor from 2,800 to 3,300, and know from experience that 2,000 revolutions is to slow for cutting down brass.

A FOREMAN BUFFER.

SAN FRANCISCO NEWS.

To the Editor of THE METAL INDUSTRY.

The first brass foundry erected on the ashes of the old one is the M. Greenberg's Sons. The first heat was taken off over two weeks ago, with no roof or siding ready, and with the carpenters pounding, while the molders were pouring and the brass finishers getting their machinery in shape. This firm is the oldest jobbing foundry in the city and was established in early days by M. Greenberg, now deceased. I think I mentioned in my last letter that the Standard Brass Works are erecting a new building. V. Kingwell has finished his foundry on Mission street, near Seventh, and will soon be ready for business. W. Garratt & Co. are doing work in their branch establishment on Fifth street, near Townsend.

Of the jobbing platers the Keystone Plating Works, formerly at Stephenson and Third streets, have erected a building on Tenth street, between Harrison and Folsom, and expect to be ready for busines next month.

The manufacturing jewelers have been hit very badly. Quite a few were established on Hardy and Trinity place, but there is nothing but a brick pile there now, and no sign of any attempt to resume business on the old site or elsewhere.

Corrugated iron buildings are springing up like mushrooms to be used temporarily and then make way for steel structures. Quite a few machine shops are running in the open, nothing but the sky as a roof.

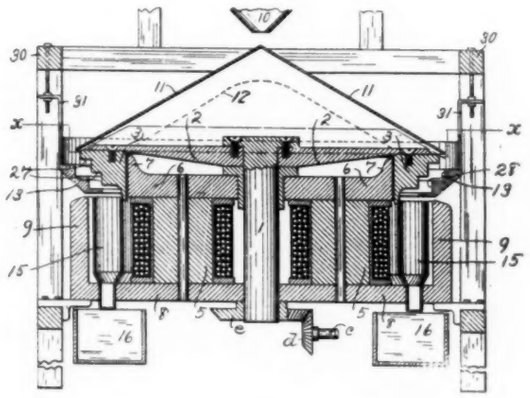
CALIFORNIAN.

Consul-General John P. Bray reports from Melbourne as follows: Manganese and decarbonized steel, and copper or motor wire are not manufactured in Australia, the supplies coming from the United States, England, and Germany, with America leading. Motors are manufactured to a small extent. There are eleven leading foundries and machine shops and eight electrical firms in Melbourne.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

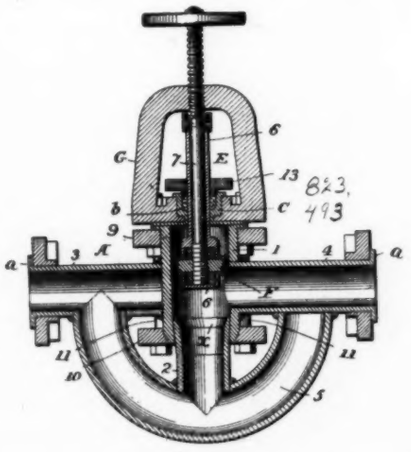
821,615. May 29, 1906. MAGNETIC SEPARATOR. Myron Dings, Milwaukee, Wis. The material is passed directly through a magnetic field and during its passage is subjected to a magnetic pull of ever increasing intensity in order to facilitate its mag-



netization. The magnetized material is removed by an air brush sufficiently powerful to overcome the residual magnetism. The machine also has a balanced carrier capable of being moved into and out of a magnetic field without side pull in the supporting bearings.

823,896. June 19, 1906. PROCESS FOR THE MANUFACTURE OF SULPHIDE OF ZINC. Georges Ranson, Brussels, Belgium. The object of this invention is to provide a process for the manufacture of sulphide of zinc having a full greasy character and which shall be capable of being reduced to a very fine powder and also shall have an extremely light density. The invention may be carried into effect by decomposing a solution of sulphide of barium by means of zincate of barium with a view to obtaining sulphide of zinc and barium hydroxide.

823,493. June 12, 1906. VALVE FOR CORROSIVE LIQUIDS. George E. Gannon, of Colorado City, Col. This valve is of soft and non-corrosive metal. It is formed of tubing of soft metal, the different sections being burned or soldered together. The ma-

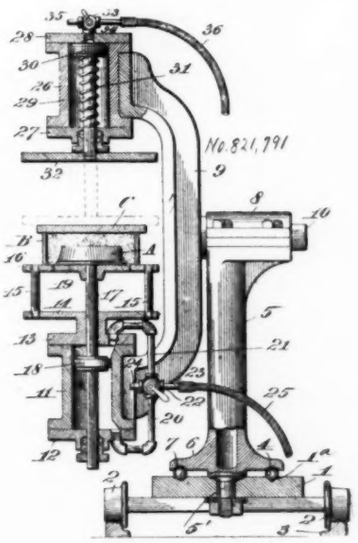


terial of which the valve is constructed is so disposed that the corrosive liquid only comes in contact with a non-corrosive metal. In addition this metal, in order that it may resist the strains due to pressure, is reinforced by stronger metal placed so that it does not come in contact with the liquid passing through the valve.

822,015. May 29, 1906. MOLDING MACHINE. L. M. Pratt, Belleville, Kansas. The machine is provided with a movable filling and delivery carriage and an agitator for the material. The carriage moves in guides in the table top. During the movement of the carriage toward the mold the material in it is agitated by revolving fingers. The movements to compress the material and release it from the mold are made by two foot levers.

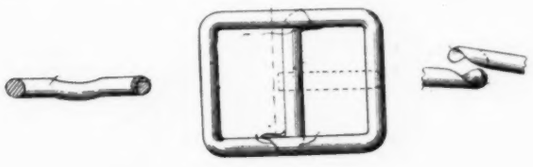
823,530. June 19, 1906. MOLDING APPARATUS. W. J. Hewlett, Kewanee, Ill. In this apparatus the sand is carried from a reservoir into the mold or flask by means of the expansive force of compressed air. The bottom of the sand chamber communicates with the mold through outlets. Compressed air is admitted at the top of the chamber and escapes through the outlet at the bottom, carrying the sand into the mold, where it is packed by the expansive force of the air. The idea may also be applied with advantage to the making of cores.

821,791. May 29, 1906. MOLDING MACHINE. W. M. Duncan, Alton, Ill. The main object of the invention is to construct a



molding machine having an open frame carried upon a single pivotal support so that the frame may be turned to afford access at the front and both sides.

823,868. June 19, 1906. WROUGHT METAL BUCKLE. C. S. and A. S. Huntington, Omaha, Neb. The buckle is made of wire or rod metal, worked cold. The blanks are so formed that when the buckle frame has been brought to its approximate shape the



ends of the blank overlap other portions of the frame in such a manner that the ends may be united by a single stroke of a swaging die. The parts are so crushed into each other that they are actually interlocked to form a strong union.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

The Cincinnati Metal Refining Company are building an additional furnace room 25 x 100 feet, one story high.

The Northern Brass Manufacturing Company, of Waukegan, Ill., has increased its capital from $14,000 to $16,500 for additional equipment.

The business of Chas. J. Bogue, 213-215 Centre street, New York, has been incorporated under the name of Chas. J. Bogue Electric Company.

The Roberts Brass Manufacturing Company, Detroit, have completed their new factory for the manufacture of their high grade brass goods.

The Lanyon Zinc Company, manufacturers of spelter and sheet zinc of Iola, Kansas, have closed their St. Louis office, making their headquarters at Iola.

R. W. Conklin, New York agent of the Granby Mining and Smelting Company, has moved his offices from the Park Row Building to 170 Broadway.

The New York office of the Kennedy Valve Company report that they will move from Coxsackie, N. Y., to Elmira, N. Y., but they do not know exactly when.

Gould & Eberhardt, foundry supplies and tools, 111 New Jersey R. R. avenue, Newark, N. J., report a very heavy business with orders enough to last a year.

A large park will be laid out in North Twelfth street, Brooklyn, formerly known as "McCarren Park," right opposite to the firm of P. McLaughlin, metal dealers.

The Indianapolis Aluminum & Brass Company has been incorporated at Indianapolis with a capital of $10,000 by John G. Blackwell, P. W. Kennedy and E. M. Blue.

The business of the Aluminum Manufacturing Company, Two Rivers, Wis., continues to prosper, although just at present the company is hampered for want of metal.

The Coe Brass Company has given to the town of Torrington, Conn., the old Coe Homestead, which will be used for a public park known as the "Coe Memorial Park."

Fisher & Morel, makers of cast iron hubs for die sinking and bronze presses, have bought the place owned by W. & J. H. Shaw at 60 Elm street, Newark, N. J., and are busy with orders.

The firm of Carver & Howell, 122 North Franklin street, Philadelphia, Pa., manufacturers of fire department supplies and all kinds of brass work, has been succeeded by William Howell.

The Swenson Valve Company has closed a two-year contract with the Ohio Brass Company, of Mansfield, Ohio, for the manufacture of the Swenson valve. This valve is of the self-grinding type.

A. T. Wall & Co., of Providence, R. I., manufacturers of rolled plate, alloys, blanks, metal stock supplies, seamless wire and seamless tubing, have incorporated as the A. T. Wall Company.

The National Smelting Company, of Brooklyn, N. Y., have secured the old smelting works of Frederick W. Downs, Bayway, N. J., and will make a specialty of smelting copper alloys and the white metals.

Nickel anodes is a specialty of the Seymour Manufacturing Company, of Seymour, Conn., who also manufacture sheet brass and German silver and copper, brass and German silver wire and tubing.

The J. D. Smith Foundry Company, of Cleveland, Ohio, are preparing plans for a number of new brass and aluminum foundries. They are making a specialty of this class of foundry work and also core ovens.

The Republic Metalware Company, of Buffalo, is erecting a large addition to its plant, consisting of a five-story brick warehouse and office building, a galvanizing building and retinning building, each one story high.

The B. F. Sturtevant Company, of Hyde Park, Mass., make an "earthquake point" that with their blower system there is no need of tall chimneys and that therefore in earthquake countries the proper thing is a short stack and forced draft.

The Rockwell Engineering Company, of 26 Cortlandt street, New York, report that they have 143 of their oil furnaces in operation in the United States, Canada and Europe, Canada having two, Europe six and the rest in the United States.

The R. B. Seidel, Inc., Phila., Black Lead Crucible Works, report a great demand for their special crucibles for oil furnaces. In this particular line their sales have increased greatly, and in their regular lines, they report a constantly growing business.

The new large white metal works of the Hoyt Metal Company at Perth Amboy, N. J., are finished and in operation, with the exception of the shot tower. The company announce that the shot tower will have the largest capacity of any in the world.

The Calumet Mining & Milling Graphite Company are erecting a $75,000 factory and plant at Calumet, Canada, about fifty-nine miles from Montreal. This plant will be in operation by October 1st, when the firm expects to turn out first class crucible graphite.

The entire assets of the International Aluminum Mining Company in the State of Georgia were sold recently to the National Bauxite Company. Receiver H. S. Calvert reports that he expects to wind up at an early date the International Corporate existence.

It is reported that the American-La France Fire Engine Company, which have their own brass foundries, will concentrate all of their plants at Elmira, N. Y. The company state that their plans are not sufficiently advanced to make public any information on the subject.

The Schmitt Valve & Metal Company, of 389 Henderson street, Jersey City, are now the occupants of the bronze foundry formerly owned by Ernest Vatier at 312 Market street, Newark, N. J. The Schmitt Company make valves and brass and white metal manufacturings.

The Pittsburgh Copper and Brass Rolling Mills, C. G. Hussey & Company, Pittsburgh, Pa., have started the brick work on their new building, where they will manufacture copper rivets and do sheet metal stamping. They expect to have it finished and running during the summer.

The Peerless Heater & Valve Company, of Detroit, has purchased the business of the Auto Brass & Aluminum Company, of Flint, Mich. The two plants have been consolidated. The Auto plant will open as soon as a working force can be obtained. About 75 men will be employed at the start.

The Pittsburgh Gage and Supply Company has nearly completed plans for the erection of its new plant at Thirtieth and Liberty streets, Pittsburg. It will be 168 x 174 feet, six stories in height, of brick and steel, slow burning construction. The new plant will have about 210,000 square feet of floor space.

The Day Foundry Company has been incorporated at Buffalo with a capital of $20,000. The directors are Reginald F. Day, William Smith and P. B. McNaughton. The company is about to start an up-to-date brass, bronze and aluminum foundry and will be ready for business the 15th of the present month.

Wilcox, Crittenden & Company, of Middletown, Conn., manufacturers of marine hardware, will erect an addition to their works, 60 x 100 feet, four stories. The extra space will be devoted to machine shop purposes. Work will be pushed forward so that the shops may be occupied at the earliest possible date.

J. H. Gautier & Company, of Jersey City, N. J., who have been making crucibles for over half a century, have recovered from the effects of their fire of two months ago and are now shipping crucibles and in a position to fill all orders. They have a reputation of making crucibles which have a high average of heats.

F. H. Wheeler has bought one-third interest in the Langsenkamp Brothers Brass Works, Indianapolis, and the firm will hereafter be known as Langsenkamp Brothers & Wheeler, brass founders and finishers. The firm has bought the Chenoweth power plant and will establish a large brass foundry and finishing shop.

The Aluminum Foundry Company, of Manitowoc, Wis., has been incorporated with a capital of $15,000 by Conrad Werra, Henry Stahl and Julia Werra. The company has made large additions to its plant during the past season and is further increasing its facilities. It has closed contracts for deliveries until July, 1907.

One of the simplest and most useful devices ever invented for the use of platers and users of acids is the Carboy Inclinator, made by the Carboy Inclinator Company, 1328 Columbia avenue, Philadelphia, Pa. It has been described and illustrated in THE METAL INDUSTRY and further particulars may be found on another page.

The Gaynor & Mitchell Manufacturing Company, Bridgeport, Conn., has been incorporated with a capital stock of $60,000. The incorporators are Arthur C., Joseph F. and Angelo Gaynor. The business was formerly carried on as a co-partnership. The concern was established in 1887 and manufactures special articles of sheet metal, wire, tubing, etc.

Our San Francisco correspondent reports that there is an active demand in San Francisco and vicinity at the present time for a cheap goggle. The city now has the trade winds and the dust from the earthquake ruins is something frightful. Therefore, protection for the eyes is needed and automobile goggles are too expensive for the majority of the workmen.

The Finkell-Hachmeister Chemical Company, of 1910 Forbes avenue, Pittsburgh, Pa., report that they have an enormous trade in their new red copper compound and other chemicals which they manufacture and import. The red copper compound is now being bought in barrel lots and is giving universal satisfaction. A complete description of this useful compound has been published in THE METAL INDUSTRY.

C. W. Leavitt & Company, 220 Broadway, New York City, announce that they are prepared to furnish magnesium copper, magnesium tin, magnesium zinc, magnesium aluminum, magnesium nickel at prices from $1.00 to $1.50 per pound, and magnesium metal for $1.50 per pound. They make a specialty of importing and selling the rare metals which are coming into more common use for metallurgical purposes.

C. J. Donovan, who has just established a brass foundry at Haverhill, Mass., known as the Haverhill Brass Foundry, has secured all of his foundry equipment and has begun to melt metal. He purchased his flasks from the Brass Founders' Supply Company, of Newark, N. J. Mr. Donovan has been a brass foundry foreman for 21 years, seven of which were spent with the B. F. Sturtevant Company, of Hyde Park, Mass.

The United Wire and Supply Company, of Providence, R. I., are building a 72 x 104-foot addition to their Pawtucket plant. The new building is of reinforced concrete construction, two stories high. The company will install a 120 horse-power Diesel engine connected to a generator. The drive will be with electric motors throughout. Considerable new machinery has been ordered for this plant, which is expected to be running about January 1st.

Robert F. Carroll & Son, owners and proprietors of the Providence Silver Plate Company, Providence, R. I., announce that they have bought the entire casket hardware department of the H. M. Van Deusen Whip Company, of Westfield, Mass., by which purchase they have come into possession of one of the finest equipments in the country for the production of casket hardware. With this additional equipment they are able to offer handles and plates at very reasonable prices.

The stock and machinery of the Art Brass Company, of Boston, was recently sold at public auction. The plant consisted of high grade machinery and had been used but a short time. There were many bidders, but the largest purchasers were C. H. Buck & Company, of Boston, who say they are now the only manufacturers of art brass and metal signs in quantity in New England. Having all the drawings, negatives and lithographic stones they are now prepared to duplicate the work recently done by the late company.

The Bates & Peard Annealing Furnace Company, of Liverpool, England, announce that His Majesty's Indian Government has placed an order with them for a complete equipment of three of their patent annealing furnaces for the new quick firing cartridge factory now being built at Cossipore, India, to be used for annealing British service ammunition .303. The company make a specialty of furnaces for annealing which are suitable in rolling mills and jewelry trades. Their New York representative is C. M. Dally, 29 Broadway.

The Zucker & Levett & Loeb Company, manufacturers of platers' supplies, New York City, are recovering very quickly from their complete burn-out of a month ago. They have secured a building next door to their old plant, giving them five stories in front and four stories in the rear with twice the floor space that they had in their former works. They have put in new machinery, up-to-date equipment, and are now in a position to take care of their orders. When entirely settled they will have a much better place than formerly.

The Baltimore Copper Smelting & Rolling Company, of Baltimore, Md., has just moved back into the Keyser building, which is the same building they were in before the great Baltimore fire, taking half of the space on the ninth floor for their offices. The business of the company is most active and the outlook is good for a continuance of this activity. The plant of the company is running to full capacity and their products are being distributed in all parts of the world. The Baltimore company manufactures sheet copper.

The Buckeye Tempered Copper and Brass Company, of Mansfield, Ohio, has been incorporated with a capital of $10,000. E. J.

Gilbert, T. R. Barnes, S. E. Huenerfauth, S. G. Vinson and T. F. Frank are the incorporators. The company are putting up a new brick brass foundry, which will be modern in every particular. At present they are making brass casting and commutator bars. Mr. T. F. Frank, formerly of the Mansfield Tempered Copper Company and who has had considerable experience in brass manufacture, will be in charge of the foundry.

The Hanson & Van Winkle Company, manufacturers of platers' supplies, Newark, N. J., have acquired additional property and are erecting several buildings at the corner of Chestnut and Van Buren streets. The construction includes a reinforced concrete building 200 x 60, for the manufacture of dynamos; a four story, 50 x 30 brick building for storage purposes; a 40 x 50 building for the manufacture of rouge, and a power plant of 300 H. P., with 100 foot stack. The company now own one entire city block and half of the one adjoining.

The Maryland Brass and Metal Works, Baltimore, Md., will expand and will put up a large building at the southwest corner of Guilford and Girard avenue alongside the tracks of the Northern Central Railroad. The lot has a frontage of 327 feet by 254. The works will be of brick and steel construction and designed by Henry J. Tinley. The Maryland Brass and Metal Company now operate a large foundry on the east side of Guilford and Girard avenues, directly opposite the new building. The company are dealers in new and old metals and make castings of every description. William Gisriel is president of the company.

Among the proposals of the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., are the following: Schedule 28, copper rivets, sheet copper and lead, pig tin, slab zinc; Schedule 22, Muntz metal, bronze, copper and iron; Schedule 21, brass nuts, sheet brass and copper, sheet zinc, nickel anodes; Schedule 21, strip brass; Schedule 23, bronze rod; Schedule 32, phosphor-bronze, brass bolts, brass, copper and lead wire, sheet brass and copper, naval bronze, brass pipe fittings and copper tubing. Bids on the above are to be opened at 10 o'clock, July 17th and 24th, 1906. Further particulars and blanks may be had from the Bureau.

It is reported that the United Metals Selling Company, of New York, will increase its capital stock from $5,000,000 to either $8,000,000 or $10,000,000 and that the new stock will be apportioned among the stockholders as a stock dividend. The company has been paying dividends at the rate of 20 per cent. per annum for some time and has also financed the construction of a new refinery at Perth Amboy, N. J. The company has recently secured the control of the output of several of the new producing copper mines, in addition to the big ones that they have handled for some time. The United Metals Selling Company will neither confir mnor deny this report.

The Monarch Valve and Manufacturing Company has been organized at Springfield, Mass., to manufacture valves and valve gates and are now located in their new plant and have their first force of men at work. It is planned to begin with the manufacture of valves from 1½ to 2 inches and to take up gates as soon as possible. The company is incorporated under the Massachusetts laws, with an authorized capital of $75,000. The officers are: President, Charles J. Roadstrand; Vice-President, J. W. Superneaw; Treasurer, Stuart A. Robson; Clerk, H. E. Jodoin, all of Springfield; Superintendent, Fred M. Lane, formerly with the Chapman Valve Manufacturing Company.

The Dow Chemical Manufacturing Company, Mansfield, Ohio, announce that they have secured the services of Mr. G. L. Wallace, formerly of the Zucker & Levett & Loeb Company, of New York City as their representative in the Eastern and New England States. The Dow company have opened a branch office and salesroom at No. 366 Fairfield avenue, Bridgeport, Conn., under the management of Mr. Wallace. The company also announce that the rumor stating that they are using a second or "B" grade of Canadian nickel in their anodes is false and that they are willing to make an affidavit at any time or place that the Dow Chemical Manufacturing Company use nothing but the best "A" nickel in the manufacture of their anodes.

PRINTED MATTER

A circular from the Buffalo Valve Company, Buffalo, N. Y., describes their new three-seat bung valve for barrels, kegs, etc.

Two catalogues from the N. N. Hill Brass Company, of East Hampton, Conn., deal with bells for the hardware and saddlery trade, and bells and toys.

"Distinctive Signs" is the title of a very neat pamphlet by C. H. Buck & Company, of Boston, makers of metal signs and tablets of attractive design.

The Joseph Dixon Crucible Company, of Jersey City, have issued a pamphlet on "Unions for Steam Pipes." It describes the several varieties of unions and presents much valuable information concerning the same.

The Waterbury Crucible Company, Waterbury, Conn., has prepared a pamphlet describing their black lead crucibles. It contains a number of engravings illustrating their factory, and some tables of the sizes of their crucibles.

Catalogue No. 100, by Lyon, Conklin & Co., Baltimore, Md., manufacturers of eave trough, pipe, ridge roll, roll roofing, etc., and dealers in tin plate and tinsmith's supplies, is a handsome volume of 170 pages dealing with their specialties.

Catalogue No. 12, just issued, of the Brass Founders Supply Company, of Newark, N. J., deals with their very complete line of equipment for the brass foundry. Their improved ribbed flasks prevent shifting and are lighter and more rigid than former designs.

"The Billow System," fuel oil appliances is described and illustrated in a very complete catalogue. The atomizers, fuel oil pumping systems and fuel oil furnaces manufactured by the National Supply Company, of Chicago, are well known throughout the entire country.

The May-June number of the Bulletin issued by The S. Obermayer Company, of Cincinnati, contains valuable articles on Fire Clays and Moulding Sands, Pickling Castings, Brief History of the Foundrymen's Association, and a letter describing the brass and iron foundries in the Canal Zone at Panama.

An unusually attractive catalogue has just been prepared by J. H. Williams & Co., of Brooklyn, N. Y., manufacturers of drop forgings of iron, steel, copper, bronze and aluminum. The range of work done by this concern may be judged from the statement that of wrenches alone there are listed about 700 assorted sizes of 32 patterns, with a range of openings for every size bolt from ⅛ to 5 inches, inclusive.

Combs, hairpins, household goods, advertising novelties, specialties, fancy goods, etc., made by the Aluminum Manufacturing Company, Two Rivers, Wis., are described in a handsome catalogue just issued. Their "Silveroid" aluminum combs are especially hard and springy, made of pure aluminum and a little alloy containing silver, to give them greater brightness and resistance to bending. Their bicycle guards are stamped out of one piece of hard aluminum and are beaded to give them further strength; the metal varies from No. 14 to No. 22 as desired.

A pamphlet dealing with high grade alloys produced in the electric furnace has been issued by George G. Blackwell Sons & Co., Limited, Liverpool, England. The first part of the catalogue relates to the ferrous alloys, but there are a number of

pages devoted to their brass foundry department, which includes such metals and alloys as metallic silicon, silicon-copper, manganese-copper, magnesium-copper, aluminum, also fluor spar and other products of use in the brass foundry. Besides a description of the different metals the pamphlet gives the atomic weight, specific gravity and symbol of each metal.

CATALOGUE BUREAU

Trade Getting Trade Literature. That is just the kind that is produced by THE METAL INDUSTRY Catalogue Department. Our output is neat and attractive, and correct in every detail. During the hot months of summer, when you do not feel like working, let us work for you. We can make you a catalogue that will be ready to bring trade when the Indian Summer days are with us again.

FIRES

The plants of the Atlanta Iron & Brass Bed Company and the Atlanta Spring Bed Company, of Atlanta, Ga., were destroyed by fire on June 21st with a loss of $60,000, but the companies inform us that it is their intention to re-build as early as possible both plants and to make each much larger and better than ever.

ASSOCIATIONS

The Merchants' Association of New York, whose purpose is to foster the trade and welfare of New York City, has arranged for the construction of a building of its own, known as "The Merchants' Association Building." It will be located at 66 Lafayette street, New York. The association now numbers upwards of 1,100 firms and individuals, and last year over 9,000 visiting buyers registered at its offices. The association recently issued a Guide Book of New York which contains valuable information for all visitors to the metropolis.

PERSONALS

Mr. J. O. Crane, formerly New York agent of the Scovill Manufacturing Company, has become General Manager of the new Michigan Copper & Brass Company, of Detroit, Mich.

Mr. Hugh McPhee, superintendent of the Eaton, Cole & Burnham brass foundry at Bridgeport, Conn., is touring Europe and making a general inspection of the leading industrial metal plants.

Herman S. Hastings, for several years secretary of the Worcester Metal Trades Association and head of the Worcester Labor Bureau, has been elected a representative of the National Founders' Association. Mr. Hastings will be located in New York.

William Gottlob has ceased to be a member of the Aluminum & White Metal Manufacturing Company, of New York. All the assets and liabilities of the concern have been taken over by Rudolph Becker, who will continue the business under the same firm name.

E. P. Stoughton, vice-president of the Millers Falls Company and in charge of the company's New York office, has sailed for a two months' tour of Europe. Mr. Stoughton will return in September. The Millers Falls Comapny manufacture hack saws and other metal working tools.

Mr. Alfred Belfield has left H. Belfield & Co., of Philadelphia, and has become manager of Bridgman Brothers Company, of the same city. The latter company have secured a foundry in Washington avenue and have equipped it with a melting furnace, built by the Rockwell Engineering Company, of New York.

Mr. B. Muscat has been appointed manager of the Toronto branch of the Syracuse Smelting works, with headquarters at 659 Spadina avenue, Toronto, Canada. He was formerly at their New York office. The Syracuse people are sole agents in the United States for the Montreal Copper Company, Ltd., of Montreal, Can.

Mr. John A. Walker, vice-president and general manager of the Joseph Dixon Crucible Company, Jersey City, N. J., has added another laurel to his fame as a speaker on industrial subjects by a special speech delivered before the "Boost Club," New York, May 10th, on "A Concise History of Lead Pencil Making." Mr. Walker likes to make pencils and crucibles and to sell them, and his company has been very successful in doing both.

Superintendent Backus, of the Zucker & Levett & Loeb Company, of New York, saved the right thing from their recent fire. Several of those who rushed from the rapidly spreading flames grabbed their coats, hats, cuffs or any personal property that was handy, but Superintendent Backus picked up his card index. When the company had secured a new building and started in to equip it, Mr. Backus found that his card index was one of the most valuable assets for the time being, particularly as it contained a record of sellers of supplies.

DEATHS

The metal industry, particularly that branch of it which deals in metals, will regret to learn of the death of Fritz Bornholz, who died June 10th, 1906, at Butler, N. J., at a sanitarium, where he had gone to recover from the effects of a long illness from pleurisy. Mr. Bornholz was born December 25th, 1853, at Berlin, Germany, and came to America when twenty-one years of age. For many years he engaged in the metal business at 93 Cliff street, New York, and was a member of the New York Metal Exchange until April, 1902, when he went to California, but returned to New York to engage in the metal business again in November, 1904. Mr. Bornholz always took a great interest in the smelting, refining and production of metals, as well as the selling of them, and gave the business considerable study, metallurgically as well as commercially. He was of a genial, pleasant disposition and he will be missed by the trade at large.

METAL MARKET REVIEW

NEW YORK, July 6, 1906.

The London market for standard warrants, after reaching £86 on the 8th, has since broken £5 per ton and at the close the market is more or less irregular. Opening at £84 17s. 6d., price reached £86 on the 8th and close at £81 5s.

In the New York copper market we have probably seen the highest prices in copper for the year, and this will probably stand good in regard to all the other metals. Most of the large consumers were very cleverly taken care of at about the top of the market last month, and since then the market has been decidedly easier and prices could be shaded from ⅛ cent to ¼ of a cent from the highest. The market to-day is very dull, producers are fairly well sold ahead and consumers are well covered for two or three months. The exports continue fairly heavy, but nothing very extraordinary. June exports were 17,659 tons, against over 22,000 tons a year ago, and the exports for the first half of 1906 total about 29,000 tons less than the same period last year.

Production is increasing every day, costs are being cut down and the general trend of the copper market as we see it is gradually working to a lower level of values. There is not going to be any big break in prices, but a market more in the buyer's favor than we have had for some months. We quote the spot market to-day: Lake, 18.75; August, September, October, 18.50 to 18.62½; Electrolytic, 18½ to 18⅝; Casting, 18⅛ to 18⅜.

TIN.—London opened at £179 15s. and after being pushed up to £183 5s. on the 8th the price broke and on the 14th touched £175 5s., closing at £177 5s., a decline of £2 10s. for the month. Statistically the market is not in good shape and we may see lower prices for a time again, but it all deepnds on the American demand.

The New York market has held fairly steady, with a big consumptive demand. Deliveries are estimated at 3,250 tons for the month. We have a spot stock here of about 1,200 tons, with 3,400 tons afloat. Market closes to-day: Five-ton lots, spot, 39⅛; July-August, 38⅞ cents.

LEAD.—The foreign lead market has ruled dull and quiet. Opened at £16 17s. 6d., touched £17 on the 7th and closed at £16 15s.

The New York market has been dull, with no change in price by the lead trust. The spot market has been controlled by the foreign lead here. The market to-day is: Spot, carloads, 5.82½; July-August, 5.80.

SPELTER.—Foreign spelter market has been dull and prices have declined about 10s. a ton during the month.

The New York market has been strong and weak in turns. Prices have been run up 10 to 15 points, with "big orders in market," and then let down again. At the moment the market is dull at about 6.05 for shipment to New York. Small lots, spot, New York, 6.20 to 6.25.

ANTIMONY.—The London market has declined about £17 per ton during the month. The New York market is dull and easier at from 23.00 to 24.00 cents per pound, according to brand.

ALUMINUM.—No change in price, and the demand is still beyond the powers of the one producer.

SILVER.—London prices for the month are a shade lower. Opened at 31⅛ and closed at 30 3-16. Nothing new in the New York market. Opened at 67⅜ cents and closed 65¼ cents.

SHEET BRASS AND COPPER.—The mills are full of orders and prices are unchanged.

OLD METALS.—Market dull and prices are a shade easier on all lines. Copper is dull and prices have to be cut to get orders. Zinc dross dull; 4.75.

TRADE WANTS

AN EXCHANGE FOR THE WANTS OF THE METAL TRADES.

Advertisements will be inserted under this head at 30 cents per line, 4 lines one dollar, for each insertion. Answers sent in our care will be forwarded.

FOR SALE

FOR SALE—Two EZRA SAWYER MAGNETIC METAL SEPARATORS, in good condition. Address SAWYER, care THE METAL INDUSTRY.

FOR SALE—A quantity of seamless steel tubing. For particulars address, SEAMLESS TUBING, care THE METAL INDUSTRY.

FOR SALE—5 to 10 tons prime remelted SPELTER; also 5,000 pounds TERNE METAL. Quotations upon application. Address P. McLAUGHLIN'S SONS COMPANY, 230-236 North Twelfth street, Brooklyn, N. Y.

FOR SALE—German Silver Scrap, mostly in the form of sheets, viz.:

14,710 lbs. 10 per cent.;
8,000 lbs. 16 per cent.;
6,339 lbs. 18 per cent. Good clean scrap. Address stating price offered, GERMAN SILVER SCRAP, care THE METAL INDUSTRY.

SITUATIONS OPEN

WANTED—FOREMAN BRASS MOLDER for engineers' and plumbers' work. One familiar with machine work. State experience and salary expected. Address, PLUMBERS' WORK, care THE METAL INDUSTRY.

WANTED—SUPERINTENDENT in a brass manufacturing plant in Chicago Ill.; one familiar with modern methods and able to reorganize a plant already established; young, up-to-date man desired. Must be non-union. Address, MODERN METHODS, care THE METAL INDUSTRY.

WANTED—Two (2) first-class BRASS MOLDERS familiar with plumbing supply work. Address UNION METAL WORKS, 80 Carter street, Chelsea, Mass.

WANTED—A FIRST CLASS man to work in and take charge of a BRASS FOUNDRY making plumbing supply goods. such as faucets, etc. State salary expected when applying, also experience. Address A. B. C., care of THE METAL INDUSTRY.

WANTED—ENERGETIC BUSINESS MAN with capital to finance hardware manufacturing plant near San Francisco, Cal. A1 proposition. Address MR. E. R. S., Richmond P. O., Cal.

WANTED—A Pompeian or Acid Green FINISHER on gas portable work made from brass and plated metal. Address PORTABLE, care THE METAL INDUSTRY, 61 Beekman street, New York City.

WANTED—CLOSE PLATER in city 600,000 inhabitants, must be able to do all kinds of work, and be sober and energetic. State experience and salary, also age and whether married or single. Address CLOSE PLATER, care THE METAL INDUSTRY.

WANTED—BRASS FOUNDRY FOREMAN, must know how to handle men, be first-class Moulder and Metal Mixer, experienced in all kinds of light and heavy work, and general jobbing in Brass, Bronze and Aluminum. Address MOULDER, care THE METAL INDUSTRY.

SITUATIONS OPEN—Continued

WANTED BUYER—Experienced buyer for manufacturing concern in middle West in general lines. Applicant must give experience, reference and salary expected. Address BUYER, care THE METAL INDUSTRY.

SITUATIONS WANTED

(Persons answering advertisements under this head should state whether they desire position in Brass or Iron Foundry, their specific branch of Plating or Finishing, etc.)

SITUATION WANTED—FOREMAN or MANAGER of a brass foundry desires position. Address BOX 24, care THE METAL INDUSTRY.

MISCELLANEOUS WANTS

WANTED—A No. 3½ tube swaging machine, in good condition. Address, with particulars, BOX 1036, WATERBURY, CONN.

WANTED—MANUFACTURERS of PINS and WIRES used in the CASKET HARDWARE trade. Address HARDWARE, care THE METAL INDUSTRY.

ANALYSIS FOR ONE DOLLAR:—Brass, Bronze, Terne or Babbitt. Assay for five dollars: Tin, Terne or Lead Drosses. Address THE CHEMIST, Tazewell White Lime Works, North Tazewell, Va.

ANNOUNCEMENT.—We have come into possession of one of the finest equipments in the country for the production of casket hardware and can offer handles and plates at very reasonable prices. PROVIDENCE SILVER PLATE COMPANY, 677 CRANSTON ST., PROVIDENCE, R. I.

I am looking for a specialty that can be manufactured to advantage in connection with an established BRASS JOBBING FOUNDRY at Cleveland, Ohio. Address, CLEVELAND, care THE METAL INDUSTRY.

CASH PAID for old precious metals and minerals in any form. Gas mantle dust, bronze powder, bismuth, platinum, mercury, nickel, etc. Address JOSEF RADNAI, 32 Fulton street, New York City.

INFORMATION BUREAU

Subscribers intending to purchase metals, machinery and supplies and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Our Information Bureau is for the purpose of answering questions of all kinds. Send for circular.

OFFICE HEADQUARTERS

When visiting New York, the out-of-town friends of THE METAL INDUSTRY are invited to make our office their headquarters, where a writing desk and telephone service will be at their disposal. Every one interested in the non-ferrous metals and alloys is invited to call.

Metal Prices, July 9, 1906

METALS.	Price per lb.
COPPER, PIG, BAR AND INGOT AND OLD COPPER	
Duty Free. Manufactured 2½c. per lb.	
Lake, car load lots	18.75
Electrolytic, car load lots	18.50
Casting, car load lots	18.25
TIN—Duty Free.	
Straits of Malacca, car load lots	37.50
LEAD—Duty Pigs, Bars and Old 2⅛c. per lb.; pipe and sheets 2½c. per lb.	
Pig Lead, car load lots	5.80
SPELTER—Duty 1½c. per lb.	
Western car load lots	6.10
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	38.00
100 lb lots	36.00
Ton lots	35.00
ANTIMONY—Duty ¾c. per lb.	
Cooksons, cask lots	25.00
Hallets, cask lots	24.00
Other, cask lots	23.00
NICKEL—Duty 6c. per lb.	
Large lots	.45 to .50
Small lots	.50 to .65
MANGANESE—Duty 20%	.70
MAGNESIUM—Duty Free	$1.50 to $1.60
BISMUTH—Duty Free	1.60 to 1.70
CADMIUM—Duty Free	1.50 to 1.60
PHOSPHORUS—Duty 18c. per lb.	
Large lots	.42
Small lots	.50 to .75
	Price per oz.
GOLD—Duty Free	$20.67
SILVER—Duty Free	.64¾
PLATINUM—Duty Free	24.00
QUICKSILVER—Duty 7c. per lb. Price per Flask	41.00

OLD METALS.	Price per lb.	
Heavy Cut Copper	16.50	17.00
Copper Wire	16.00	16.50
Light Copper	15.00	15.50
Heavy Mach. Comp	15.00	15.50
Heavy Brass	11.00	11.50
Light Brass	9.00	9.50
No. 1 Yellow Brass Turnings	10.00	11.00
No. 1 Comp Turnings	12.00	13.00
Heavy Lead	5.40	5.50
Zinc Scrap	4.50	5.00
Scrap Aluminum, sheet, pure	25.00	29.00
Scrap Aluminum, cast, alloyed	20.00	25.00
Scrap Aluminum, turnings	10.00	12.00
Old Nickel	15.00	25.00
No. 1 Pewter	26.00	27.00

	Price per lb.
SILICON COPPER, according to quantity	.36 to .38
PHOSPHOR COPPER, 5%	.24 to .26
Phosphor Tin	.45 to .46
Brass Ingot, Yellow	.13 to .14
Brass Ingot, Red	.15 to .18
Bronze Ingot	.15 to .17
Manganese Bronze	.20 to .22
Phosphor Bronze	.20 to .23

ZINC—Duty, sheet, 2c. per lb.	Price per lb.
600 lb. casks	8.25
Open casks	8.75

PRICES OF SHEET COPPER.

SIZES OF SHEETS.		96oz. & over 75 lb. sheet 30x60 and heavier	64oz. to 96oz. 50 to 75 lb. sheet 30x60	32oz. to 64oz. 25 to 50 lb. sheet 30x60	24oz. to 32oz. 18¾ to 25 lb. sheet 30x60	16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60	14oz. and 15oz. 11 to 12½ lb. sheet 30x60
		CENTS PER POUND.					
Not wider than 30 ins.	Not longer than 72 ins.	23	23	23	23	23	24
	Longer than 72 ins. Not longer than 96 ins.	23	23	23	23	23	24
	Longer than 96 ins.	23	23	23	23	23	25
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	23	23	23	23	23	25
	Longer than 72 ins. Not longer than 96 ins.	23	23	23	23	23	25
	Longer than 96 ins. Not longer than 120 ins.	23	23	23	23	24	26
	Longer than 120 ins.	23	23	23	24	25	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	23	23	23	24	25	27
	Longer than 72 ins. Not longer than 96 ins.	23	23	23	24	26	28
	Longer than 96 ins. Not longer than 120 ins.	23	23	23	25	27	31
	Longer than 120 ins.	23	23	24	26	29	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	23	23	23	24	26	29
	Longer than 72 ins. Not longer than 96 ins.	23	23	23	25	27	32
	Longer than 96 ins. Not longer than 120 ins.	23	23	24	26	29	
	Longer than 120 ins.	24	24	25	27	31	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	23	23	24	26	31	
	Longer than 96 ins. Not longer than 120 ins.	23	23	25	28	33	
	Longer than 120 ins.	24	24	26	31		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	24	24	26	29		
	Longer than 96 ins. Not longer than 120 ins.	25	25	27	30		
	Longer than 120 ins.	26	26	28	32		
Wider than 108 ins.	Not longer than 132 ins.	27	27	29			
	Longer than 132 ins.	28	28	31			

Rolled Round Copper, ⅜ inch diameter or over, 23 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 3½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, July 9, 1906

Net Cash Prices.

COPPER BOTTOMS, PITS AND FLATS.

14 oz. to square foot, and heavier, per lb.....27c.
12 oz. and up to 14 oz. to square foot, per lb.....28c.
10 oz. and up to 12 oz.....30c.
Lighter than 10 oz.....33c.
Circle less than 8 in. diam., 2c. per lb. additional.
Circles over 13 in. diam. are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

PRICE LIST FOR ROLL AND SHEET BRASS.

Prices are for 100 lbs. or more of Sheet Metal in one order.

Brown & Sharpe's Gauge the Standard.

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Wider than and including	2 12	12 14	14 16	16 18	18 20	20 22	22 24	24 26	26 28	28 30
To No. 20 inclusive..	.22	.23	.25	.27	.29	.31	.33	.36	.39	.42
Nos. 21, 22, 23 and 24	.22	.24	.26	.28	.30	.32	.34	.37	.40	.43
Nos. 25 and 26.....	.23	.24½	.27	.29	.31	.33	.35	.38	.41	.44
Nos. 27 and 28.....	.23	.25	.28	.30	.32	.34	.36	.39	.42	.45

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add 7 cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from list 17½ per cent.

PRICE LIST FOR BRASS AND COPPER WIRE.

BROWN & SHARPE'S GAUGE THE STANDARD.	Com. High Brass.	Low Brass.	Gilding Bronze and Copper.
All Nos. to No. 10, Inc.....	$0.23	$0.27	$0.28
Above No. 10 to No. 16.....	.23½	.27½	.28½
Nos. 17 and 18.....	.24	.28	.32
" 19 and 20.....	.25	.29	.33
No. 21.....	.26	.30	.34
" 22.....	.27	.31	.35
" 23.....	.28	.32	.36
" 24.....	.30	.34	.38

Discount, Brass Wire, 15 and 2½ per cent.; Copper Wire, 15 and 2½ per cent.

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ in. to 3½ in. O. D. Nos. 4 to 13 Stubs Gauge, 22c. per lb.
Seamless Copper Tubing, 25c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe size.	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb..	30	29	24	23	22	22	22	22	22	22	22	23	24	26	28	29

BRAZED BRASS TUBING.

Brown & Sharpe's Gauge the Standard.

Per lb.

Plain Round Tube, ⅜ in. up to 2 in., to No. 19, inc.....$0.35
" " " ⅜ " " ¾ " " 19, " 36
" " " ½ " " ⅝ " " 19, " 38
" " " ⅜ " " ½ " " 19, " 41
" " " ¼ " " ⅜ " " 19, " 48
" " " 7/32 " " ¼ " " 19, " 65
" " " ⅛ " " 7/32 " " 19, " 1.00
" " " 1/16 " " ⅛ " " 19, " 1.50
Smaller than ⅛ inch.....Special
2 inch to 3 inch, to No. 19, inclusive..... .38
3 inch ..... .40
Over 3 inch to 3½ inch..... .45
Over 3½ inch..... .50

Bronze and copper advance 3 cents. Discount 25 and 5 per cent.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

Wider than and including	*3in. .. 12in. in coils.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.	Cutting to Length.	Polishing or Satin Finishing one Side.
W. 13 and heavier..	44	44	46	46	46	46	49	49	49	1	2
" 14.....	44	44	46	46	46	46	49	49	49	1	2
" 15.....	44	44	46	46	46	46	49	49	49	1	2
" 16.....	44	44	46	46	46	46	49	49	49	1	2
" 17.....	44	44	46	46	46	46	49	49	49	1	3
" 18.....	44	44	46	46	46	46	49	49	52	1	3
" 19.....	44	44	46	46	46	46	49	50	53	1	4
" 20.....	44	46	46	46	46	48	51	52	54	1	4
" 21.....	44	48	48	48	48	50	53	54	60	2	5
" 22.....	44	48	48	48	50	50	53	57	61	2	5
" 23.....	44	48	48	48	50	50	53	59	62	2	6
" 24.....	44	48	50	52	52	52	55	61	64	2	6
" 25.....	46	49	51	53	53	53	56	63	67	2	7
" 26.....	46	49	52	56	56	56	61	65	71	2	8
" 27.....	46	50	54	58	58	59	64	68	74	2	10
" 28.....	46	50	56	58	59	59	66	72	77	2	11
" 29.....	48	51	58	60	62	62	71	77	82	2	13
" 30.....	48	52	60	62	66	72	79	82	87	2	15
" 31.....	50	54	62	65	70	78	81	84	90	3	17
" 32.....	52	56	64	68	76	84	91	97	102	3	19
" 33.....	54	58	67	72	80	91	98	107	117	3	21
" 34.....	57	62	69	77	85	98	110	117	127	3	25
" 35.....	..	72	77	87	97	107	122	132	..	..	..*
" 36.....	..	87	97	107	122	127	142	..	..	..	..
" 37.....	..	102	112	127	142	157	172	..	..	..	..
" 38.....	..	122	137	152	167	182	202	..	..	..	..
" 39.....	..	142	162	182	202	222	..	..	..	..	..
" 40.....	..	172	202	222	242	..	..	..	..	..	..

*Polished or scratch brushed 2 sides, double above prices.

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are for 50 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST OF SEAMLESS ALUMINUM TUBING—STUBS' GAUGE.

Stubs' G.	¼"	⅜"	½"	⅝"	¾"	1"	1½"	2"	2½"	2¾"
4 to 11....	..	..	96	86	83	77	67	61	61	61
12.....	..	1.08	96	86	83	77	67	61	61	61
13.....	..	1.08	96	86	83	77	67	64	64	64
14.....	..	1.08	96	86	83	77	67	64	64	64
15.....	..	1.12	96	89	86	80	70	67	67	67
16.....	..	1.15	99	93	89	83	70	70	70	70
17.....	..	1.18	1.02	96	93	86	73	73	73	73
18.....	1.85	1.24	1.05	99	93	86	77	77	77	80
19.....	1.88	1.28	1.08	1.02	99	93	83	80	80	83
20.....	1.95	1.31	1.15	1.08	1.05	99	89	86	86	89
21.....	2.01	1.37	1.21	1.15	1.12	1.05	99	93	93	96
22.....	2.17	1.44	1.24	1.18	1.15	1.08	1.05	99	1.05	1.05
23.....	2.33	1.50	1.31	1.24	1.21	1.15	1.15	1.08	1.15	1.15
24.....	2.48	1.60	1.37	1.31	1.28	1.18	1.21	1.21	1.24	..
25.....	2.65	1.69	1.47	1.37	1.34	1.28	1.34	..	..	..

Prices are for lots of 50 lbs. Boxing extra. Smaller, larger and intermediate sizes furnished by manufacturers.

PRICE LIST FOR ALUMINUM ROD AND WIRE—B. & S. GAUGE.

Diameter B. & S. G'ge.	0000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb....	40	40½	40½	41	41½	42	42½	43	44	45	46	49	54

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12.....	$0.52	16.....	.58
13.....	.53	17.....	.59
14.....	.54	18.....	.60
15.....	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 40 per cent.

Munts or Yellow Metal Sheathing (14" x 48") .....18c. lb. net base.
" " " Rectangular Sheets other than Sheathing ....20c. " " "
" " " Rod ....19c. " " "
Tobin Bronze Rod..... .....21c. " " "
Above are for 100 lbs. or more in one order.